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NATURE AND COGNITION OF SPACE AND TIME

BY

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PREFACE.

The following discussion of the Nature and our Cognition of Space and Time is grounded on the fundamental postulates of dualistic Realism. It maintains the reality of space and time in contradiction to the Kantian hypothesis of ideality; space being held to be real as an independent entity, and time as an attribute or property of entities.

In this period of idealistic vagueness and wordiness and of eccentricity and novelties in philosophy, the positive and unequivocal advocacy of the principles of realism is likely to be imputed to bold assertiveness that is the stronger because of ignorance of the history and trend of philosophy; or to belatedness and incompetency. It must expect satirical and slashing reprobation certainly from the followers of the Berkeleian and the Kantian idealism, and from those who are captivated with the subtilties and pretensions of what is strangely called the "new realism."

Some fifty years ago there occurred in this country an extraordinary change as to the prevalent type of philosophy. Formerly the Scottish realistic philosophy,—the philosophy of Reid, Hamilton, Mansel, McCosh,—was very generally current with us, being accepted and taught in most of our institutions of learning, and esteemed widely in philosophical circles. But there came a great revolution. The realists to a very considerable extent surrendered their supremacy, and subsided; and the idealists came into the ascendency. Singularly enough, those modes of idealism which the Scottish philosophy had most strenuously combated, at last superseded it, especially among very many of our professional psychologists and metaphysicians and in a large number of our colleges and universities.

This great mutation was remarkable both for its suddenness and celerity, and for the absence of commotion and conflict. It all happened as if in a night. One day the Scottish realists chiefly were our teachers in philosophy; the next, idealists sat in their seats. It all happened, too, with very little or no turmoil or struggle. There was no clashing of

opposing protagonists; there was no bitter and stubborn strife. The one party quietly withdrew from the field, making no show of determined resistance; the other quietly entered, without the necessity of a resolute and persistent onslaught. There occurred at that time an unusual inflow of European, especially Germanic, idealistic philosophy, which may be reckoned as the chief occasion of the change.

These characteristics of the change were not creditable to the country; for they revealed the want of depth and thoroughness in our philosophical culture, and our liability to be carried about with any wind or arrival of speculative doctrine. If the prevalent philosophy had had a profound and strong hold on the national life, from thorough consideration and understading of its principles, such a change in such a manner would have been impossible. It would have held its place with obstinate spirit, and would have been supplanted only by very capable and resolute assault. So to speak, many heads would have been broken and much blood spilt before the contest was finished. The change would thus have had at any rate the dignity of a revolu-

tion, and not the reproach of a flop. It may be remarked in general that, while we may claim as a nation originality and greatness in many things, as in the physical arts and sciences and in the science and conduct of political government, yet in philosophy we are now, as we have long been, for the most part, copyists and borrowers.

Idealism, then, became remarkably prevalent and preponderant with our learned men and societies; and, probably in part because of the facility and rapidity with which it rose to the supremacy, it has been, and is not now less, notably dogmatic, arrogant and intolerant. One characteristic of its domination is the fact that it largely controls the publication of philosophical products, or the stamping of them with "Imprimatur," through its disciples as proprietors or editors of philosophical magazines and as readers and advisers to publishers. What was idealism's gain was, of course, realism's loss; but the latter retained, and still retains, its old hold upon the popular mind,—a possession that must not be undervalued.

In the crisis spoken of, the realists were dis-

advantaged, and to that extent rendered incapable of holding their ground defiantly and triumphantly against the advancing idealists, even if they had been fully determined in mind to do so, by their method of philosophizing. They relied to their hurt upon the *a priori* method and upon "beliefs" of which they were possessing and offering no scientific account. Reliance upon the empirical method alone, with no seeking of aid at all from the *a priori,* is the true policy of realism and the foundation and assurance of its future. It may be here observed, that idealists pay little or no attention to the later presentations of realism made in compliance with experiential canons, and are ignorant of them. This is made evident by their stereotyped criticisms upon "naïve realism." Many of their stock animadversions are inept towards genuine empirical realism.

We should not cease to expect that, in the faithful and thorough employment of empirical processes and principles, a better day will come for realism; a day when it shall have, with release from insolent and truculent disparagement, prosperity and progress, and the honor of a fair acknowledgment of

its worth, and when idealists, on their part, shall exhibit a magnanimous and hearty tolerance, and ability to appreciate truth that is outside the ruts or channels of their own thinking. The writer would be glad, because of the issues involved, if he should be permitted to live to behold that day or its dawning.

If the present work shall find favor in the eyes of the philosophic public, it will be followed, probably after no great interval, by a psychological essay, based on the same realistic principles and having the same aim, under the title of *Subject and Object.* In the discussion of Subject, psychology "with a soul" will be maintained with particular reference, and with particular opposition, to the psychology of Hume and his present-day followers. Some attention will be given to one of the most singular conceptions in all the history of philosophy, namely, that of an unsubstantial "permanent possibility" of thought or experience. As to Object: Matter and the perception of it will be treated with special regard to the Berkeleian immaterialism.

The writer has the temerity to hold that Berkeley's argument against the possibility of a representative knowledge, and against the existence, of external matter, deemed by idealists to be unanswerable, does yet really admit of a fair answer. It can be demonstrated that Berkeley advocated principles which may be turned to his own confutation. Other topics of the essay will be Subject and Object in their ontological Relation, and Truth considered as the correspondence of thought to its object.

THE AUTHOR.

CONTENTS.

PAGE

CHAPTER I.

Reality and Nature of Space..... 13

CHAPTER II.

Our Cognition of Space..... 63

CHAPTER III.

(Supplementary to Chapter II.)

Localization of the Tactual Sensations. 103

CHAPTER IV.

Nature and Cognition of Time..... 126

I. Reality and Nature of Time.

II. Our Cognition of Time.

NATURE AND COGNITION OF SPACE AND TIME.

CHAPTER I.

REALITY AND NATURE OF SPACE.

What is SPACE? This is indeed an old, but still a living, metaphysical question. Is Space a reality or a property or relation of realities? Or is it a form of our subjective thought having no reality in the mind or outside to which it corresponds? Is it only an appearance, a fictitious appearance, being unreal either as an entity or property?

According to the common thought and conviction, space is real empty room, illuminated or colored, continuous, tridimensional, homogeneous, permanent, or vast but unknown extension. Philosophical realists hold to the common conception of space, with the exception of light or color. This property they regard as a phenomenal projection from the mind into space; or the projection of a property of the subjective precept of space, which

property does not picture a property of objective space. Space, at least as to its extension, is held to be a reality wholly independent of our thought productive or projective.

But the majority, the great majority apparently, of the philosophical minds of our time entirely reject the common and realistic view of space, and strive to maintain rather the ideality or non-reality of space. It is said that space has no existence considered as a reality external to and independent of the mind. By many, particularly by the followers of the Kantian thought and phraseology respecting space, space is regarded as an *a priori* form of our pure subjective perception. It is declared, in effect, to be but a phenomenon or appearance, which has no real extension in itself, is no true presentation of the real extension of the mind or of any object in the mind, and is no true representation of anything outside the mind. The appearance of space is supposed, in general, to have not the slightest dependence upon or relation to actual space or extension. It is also variously held by many that space or the thought of space is generated by the mind from the absolutely non-spatial. A creative synthesis or fusion is postulated, by which the spatial arises from constituent elements, sensations, that

in themselves, while different in quality, are extensionless. It is assumed that by the genetic activity of the mind the spatial is caused to appear from series of sensations that are purely temporal, that are pure sequences, or pure reversible sequences, the terms of the series having in themselves or at the first no space intervals between them whatever. According to this view, time is original, but space derivative or generated.

The idealistic philosophers reject the ordinary realistic view of space on various grounds. Of these grounds is their supposition that that view is "self-contradictory," that it involves us in "alternative impossibilities of thought," etc. They also urge the point that the space of the realists has no attributes, especially that it has no force, mobility or activity, and is therefore incapable of making any impression on us by which it might make itself known to us. They contend that what has no power to affect us can not be said to exist. It is further argued that the doctrine of the realists implies a duality in ultimate reality, makes space an entity distinct from and independent of the Supreme Being.

The conclusion of idealists that the space of the realists contradicts itself, or "leaves us nothing but

a choice between opposite absurdities," is based in part upon arguments that relate particularly to the full extension and the divisibility, or the maximum and the minimum, of space. It should be noted, by the way, that these arguments, as employed by many later metaphysicians, are drawn largely from Kant's discussion of the "antinomy of pure reason."

1. We shall proceed to consider, first, the reasoning of idealists against the reality of space, or against the reality of space as we think of it, based upon the unknownableness of, and the self-contradictoriness of our thought about, the entire extension of space. Mr. Herbert Spencer thus states the familiar argument: "We find ourselves totally unable to form any mental image of unbounded Space; and yet totally unable to imagine bounds beyond which there is no Space." * Upon grounds, of which this our inability to think of space as either unbounded or bounded, as either infinite or absolutely finite, is a principal part, Mr. Spencer concludes that space is "wholly incomprehensible"; that the immediate knowledge which we seem to have of it proves, when examined, "to be total ignorance"; † that our idea of space is a wholly sub-

* *First Principles,* p. 48. † *Ib.,* p. 50.

jective notion resembling not in the slightest degree an objective reality or objective space. From the fact of our inability to think of space as absolutely limited, or from the compulsion that is upon us to think of every space as having space beyond, Mr. F. H. Bradley likewise argues: Space "passes away into the search for an illusory whole. It is essentially the reference of itself to something else, a process of endless passing beyond actuality. As a whole it *is,* briefly, the relation of itself to a non-existent other. For take space as large and as complete as you possibly can. Still, if it has not definite boundaries, it is not space; and to make it end in a cloud, or in nothing, is mere blindness and *our* failure to perceive. A space limited, and yet without space that is outside, is a self-contradiction. But the outside, unfortunately, is compelled likewise to pass beyond itself; and the end can not be reached. And it is not merely that we fail to perceive, or fail to understand, how this can be otherwise. We perceive and we understand that it can not be otherwise, at least if space is to be space. We either do not know what space means; and, if so, certainly we can not say that it is more than appearance. Or else, knowing what we mean by it, we see inherent in that meaning the puzzle we

are describing. Space, to be space, must have space outside itself. It forever disappears into a whole, which proves never to be more than one side of a relation to something beyond." * With such reasoning, not remarkable for well-chosen terms, clearness and strict sequence, Mr. Bradley concludes that space is not a truly known reality, but only a "contradictory appearance."

There can be no question about our inability to think of space either as infinite or absolutely limited; here are indisputable "alternative impossibilities of thought," opposite contradictories; but this fact furnishes no support to Mr. Spencer' s paradoxical conclusion that space is therefore altogether incomprehensible, that our knowledge of it is all ignorance, that our idea of space can not be in the least a true representation of objective space. We do not know the whole of space or space as a whole; but we certainly know portions of space. There is no cogency in the reasoning that since we know not the extreme regions of space we have therefore no true knowledge of its interior regions. Is it not a fact that we have clear knowledge of, that we can definitely measure, the sphere of space within the

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* *Appearance and Reality,* pp. 37, 38.

orbit of the moon? We know its radius to be about 240,000 miles. Further, have we not clear thought of, can we not definitely measure, the vastly greater sphere of space within the orbit of the earth? Is not its radius truly known to be about 92,000,000 miles? Surely the fact that we can not think of space as extending infinitely beyond the orbit of the earth, or of it as at some distant point outside this orbit absolutely finite or having no other space beyond, has not the slightest force against the reality of space within the orbit and the truthfulness of our knowledge of it. We know the space within the orbit of the earth, and we know the immediately related outside space between the orbit of the earth and the orbit of Mars; but this outside space does not seem to be necessary to a real knowledge of the inside sphere or portions; knowledge of it does not save the knowledge of the latter from being pure ignorance. Again, we know the space within the orbit of Mars, and also the immediate outer space between the orbit of Mars and the orbit of Jupiter; but this outer space can not be said to be necessary to a true knowledge of the inner sphere; or at any rate knowledge of its full extent does not save the knowledge of the inner sphere from being pure ignorance; or ignorance of its full extent would not

render the knowledge of the inner sphere total illusion. Just as truly our ignorance of the complete extension of space beyond the orbits of Jupiter and all the planets, whether it is infinite or somewhere absolutely limited, can not reasonably be said to determine the worth or reality of our knowledge of the spaces within these orbits. All the ponderous logic of the "alternative impossibilities of thought" has not the least pertinency or power against the truthfulness of our knowledge of the greatest sphere of space which we know and the interior lesser spheres. As far as this logic goes, we may continue to adhere as confidently as ever to the simple doctrine, that we truly know a portion or portions of space, but do not know all of it; that we can think of, can know, a very great length of a radius, but can not conceive how far the radius extends, whether to a finite distance or an infinite.

The presupposition upon which Mr. Spencer seems to go, as Bradley also, that we must know the totality of space to know any of it; or that as we do not know the whole we know nothing, is a very dubitable postulate. He has not thought it worth the least effort to justify this postulate; and we are under no obligation whatever to adopt it. It indeed appears gratuitous and baseless. This ques-

tion will urge itself upon every one: Why should not Mr. Spencer have held on to, as something truly known, the portion of space he could and did imagine, and let the outer space he could not imagine go in its infinity or its absolute finiteness as something not necessary to be known? Or, why should he have felt himself compelled to surrender the possibility of the true cognition, or the reality as cognized, of the space which he assumed at starting and also spoke of as divisible, because he was unable to imagine how much space lay beyond it? It seems clear he gave up too easily. He still, in spite of this inability of the imagination, might have adhered firmly to the conceivable space initially presumed, as something really existing and truly cognized. He has not succeeded in the least in showing that our ignorance of the extreme range of the perfectly homogeneous space renders impossible a true cognition of a portion of it.

There is, it must be granted, important truth in the principle that we "think in relations," or that the fullness of our knowledge of a reality depends upon the fullness of our knowledge of its relations. It may be maintained that if we should know all the relations of an object, our knowledge of it would be perfect; and that if we had perfect knowledge

of any one object, we would have knowledge of the universe.* But this principle has no manifest application to our knowledge of space so as to require us to admit that we can have no true knowledge of space unless we know the whole extent of it, whether finite or infinite; or that if we know not the whole we know nothing of it; or that our conceptions of relative portions of space are not true knowledges, but illusions, that our thought is but a subjective symbol of the unknowable and in no degree a true representation of the objective real.

All the metaphysician proves by the fact that we can not think of space as, at the farthest, either finite or infinite, is just what everybody was and is quite ready to admit, namely, that we do not know the entire extent of space. But our ignorance of the extremes of space should not greatly embroil or vex us; for we seem to be left with a true knowledge of a finite space so great as to be absolutely sufficient for all our needs and concerns. We may

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* "The simplest individual perception is determined by potential relationship to everything else in the Universe. * * * I can not say 'this book' without a reference to surroundings, which are not to be restrained from extending over the entirety of space and of time." (Haldane, *Pathway to Reality*, I. 63.)

claim to know space as far out as the fixed stars, say as far as the star Sirius, which is said to be two hundred thousand times farther away from us than our sun. Possessing the knowledge of so vast a volume, we may rest in uncertainty, if it must be, as to the outermost reach of space. For metaphysicians, then, ceaselessly to trouble themselves about their inability to think of space either as coming to an end at some point beyond the visible stars or as having no end, and on account of that inability to ignore, make nothing of, or defame the immense sphere of space which we may assume to know, and to find no comfort or satisfaction in this knowledge, appears to be metaphysical waywardness. Some have wished that we might get rid altogether of, or, as they say, get "beyond," space, "beyond the oppressive narrowness and crampiness of the world surrounding us." But such a wish seems in some respects absurd. Surely all conceivable intelligent beings should find room enough in which to live and move and have their being, with no sense of discomfort from narrowness or confinement, in the prodigious sphere of space having a thinkable radius not less than the distance from us of the fixed stars. To lament on account of narrowness or crampiness is like a minnow complain-

ing to Neptune that it had not enough of water to swim in, when it had the whole Atlantic and Pacific. It may be here noted as a curious phenomenon that some metaphysicians, like Schopenhauer, have seemingly been half angry at space because it divided things from one another.

The considerations which seem conclusive against Mr. Spencer's inference, that our knowledge of space is ignorance because we can not imagine space as either ending or endless, seem equally conclusive against the inferences of Mr. Bradley. The latter says that, since we can not reach the end of space, or must think of every space as having space beyond it, space therefore "passes away into the search for an illusory whole," "it is a process of endless passing beyond actuality," "it forever disappears," etc., and contradicts itself hopelessly. But these loose and wayward predications certainly afford no support to the main conclusion. The near or interior space which our thought traverses in its search outwards can not be said to "pass away," or pass "beyond actuality," or in anywise "disappear." On the contrary, it holds its place, it remains immovable and constant, and all the time definitely thinkable. For example, the space within the orbit of the moon does not pass away as thought pushes on to the

orbit of Mars and to the orbits of Jupiter, Saturn, Uranus and Neptune, and yet farther and farther till it sinks exhausted without finding an end. All these interior spaces remain steadfast. Not an idler assertion can be made than that they "pass away" or "disappear." There is no assignable reason why they should not be constant, and why our knowledge and measurement of them should not be true, though it be forever unknowable to us what extent of space lies outside them. If there be truth in Mr. Bradley's questionable assumption, that "space to be space must have space outside itself," there can be no less truth in the assumption that space to be space must have space inside itself; and this inside, near space has its permanent existence, and can never be reasonably said to lose its existence—to be instable, transitory and vanishing—because we can conceive no end to the outer space. Likewise our knowledge of the nearer spaces can not be justly said to be but "contradictory appearance" or ignorance. No cogent reason appears why we should not hold that our knowledge may be, and probably is, perfectly true to the reality of, for example, the spaces of the solar system to which we have referred. It seems a quite rational conclusion that we should hold on firmly to what we

can embrace of space, and what we can not embrace we should just let go and confess the limitations of our comprehension.

The impossibility of conceiving space either as having an end or having no end proves neither that space nor our thought of space is self-contradictory. Space, it is certain, can not be both finite and infinite, yet it must be one of them, for they are direct opposites; but it does not contradict itself, as by presuming to be both, or by claiming at one time to be one and at another time to be the other. There is in no way any real contradiction or inconsistency. Space gives a positive knowledge of a portion of itself, but forever conceals from us whether that portion is a part of ultimate finiteness or infinity. Metaphysicians are fantastical in imputing contradiction to space for this reason.

Nor is our thought of space self-contradictory or inconsistent and thereby demonstrating itself to be an untrue phenomenon. We easily perceive a large sphere of space without the least inconsistency in our cognition; but in our farthest perception of space we are halted by opposite impossibilities of thought. Yet there is surely no self-contradiction or self-delusion here. Our perception is by this shown to be not untrue or fictitious, but only weak.

Either space is too great for our faculty or our faculty too feeble for space; or the utmost that can be said is, that space runs out too far for our perception to follow it. In this dilemma we clearly learn the finiteness of our thought; but to be finite is not necessarily to be erratic; to be able to know only a part is not to be doomed to illusion.

After all the argumentative efforts of the agnostics with the fact of our inability to think of space as either infinite or absolutely finite, or to decide for one of these contradictory alternatives, we seem to be left in undisturbed possession of the clear and easy theory that we can know a part of space, but not all; that our knowledge of space goes to a great depth and is true as far as it goes, but it does not go to the end.

2. We move on to notice, in the second place, the reasoning of the idealists against the reality of space, or the reality of space as ordinarily thought of, based on consideration of the divisibility of space. Mr. Spencer says: "We find ourselves totally unable to form any mental image of unbounded Space; and yet totally unable to imagine bounds beyond which there is no Space. Similarly at the other extreme: it is impossible to think of a limit to the divisibility of Space; yet equally impossible

to think of its infinite divisibility." * Here, then, we have a second set of "alternative impossibilities of thought," which respects the internal division of space, and which is supposed also to require the conclusion that space is "incomprehensible," that our knowledge of it is "total ignorance." Mr. Bradley remarks upon the divisibility of space: "Any space must consist of parts; and, if the parts are not spaces, the whole is not space. * * * Anything extended is a collection, a relation of extendeds, which again are relations of extendeds, and so on indefinitely. The terms are essential to the relation, and the terms do not exist. Searching without end, we never find anything more than relations; and we see that we can not. Space is essentially a relation of what vanishes into relations, which seek in vain for their terms. It is lengths of lengths of — nothing that we can find. * * * Space vanishes internally [that is, by division] into relations between units which never can exist." † Mr. Bradley here seems to assume that space is divisible into ultimate parts that are spaceless or are non-entities, and that therefore we have the result that space is

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* *First Principles,* p. 48.

† *Appearance and Reality,* p. 37.

composed of spaceless parts; which result, however, is a contradiction, for, as he says, "if the parts are not spaces, the whole is not space." Or we have the result, that space consists of mere abstract relations, relations that have no terms to be related, or relations of units that never can be found, that never can exist. All terms have vanished or been reduced to nothing by division. He then again infers, in effect, that the only conclusion for us is, that space "has most evidently proved not to be real, but to be a contradictory appearance." We have heard of dissecting to kill; here is dividing to annihilate. In Mr. Bradley's argumentation there is implicated the traditional metaphysical assumption, that an extended thing can not be a unit, but must have parts, must be a composition, and must be divisible; that only the unextended can be a unit or simple.

But this whole reasoning of the idealists is a singular mixture of delusion and sophistry. They begin curiously with the most questionable assumption possible, namely, that space is composed of parts and is actually divisible into parts, and divisible, they appear to imply, by easy and familiar means. It must be admitted that they are quite right in presuming that the division of space is

assertable, and, as far as that goes, thinkable; and that we can not reach to an infinite length, or to an absolute limit, in this thinkable or ideal division. But a more baseless assumption was never made by metaphysicians than that which these appear to make, namely, that there is a possible and easy real division of space answering to the ideal or predicable division; or, in other words, that as there is an assertable partition, there is and must be a possible and actual partition of space. Now, in fact, not the slightest evidence is producible that space ever has been actually fractured or in anywise divided in any degree, or that it ever can be divided by any means whatsoever In all the past history of human accomplishment, there is no report of one instance of the least actual partition of space. Again, there is no evidence of any kind from all past existence of any sort of fracture of space having taken place. And at the present time who, of all men, knows of the possible division of space and of the means of effecting it; or who knows or can conceive of any disruptive force or union of such forces that can ever cause the least break in space?

It is important enough to be worthy of notice, that with the apparent actual indivisibility of space

there goes also the fact that division of any degree or into parts of any size is altogether unimaginable.* Not only are both the infinite division, and the absolutely limited division, of space unimaginable; but any division of space at all, any severance of contiguous parts, larger or smaller, maximal, medial or minimal, any severance of parts having no space or only nothingness between them, is wholly unimaginable. We can talk of the division of space, and know well what we are talking about, and be readily understood by others; but it is impossible for us to picture it. The sort of ideality that is implied in our language involves no power to image any kind of actual partition or diremption of space. The fact that we are thus unable to imagine a real division of space, and the absolute lack of evidence that any real division of it ever has taken or ever can take place, would seem to warrant the belief that such a division is an everlasting impossibility.

Further, it is deserving of particular notice that

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* Locke has remarked: "The parts of pure space are inseparable one from the other; so that the continuity can not be separated, neither really nor mentally; for I demand of any one to remove any part of it from another, with which it is continued, even so much as in thought." (*Essay*, II. xiii. 13.)

the fact that the limited and unlimited divisibility of space are both unimaginable, or are opposite impossibilities of thought, affords not any support or encouragement whatever for the assumption that yet one of them must be true, that space must be actually divisible either to a finite or to an infinite degree. Space is either finite or infinite in its total extension; but it is not either of finite or infinite actual divisibility. And the principle of Excluded Middle forces us to believe that one of the unconceivable opposites respecting the total extension must be true; but there is no such compulsion upon us to believe that one of the inconceivable opposites respecting the division of space must be true. The impossibilities of thought, either single or contradictory, regarding the divisibility of space, together with our total ignorance of any instance of actual or possible division, surely do not favor the view that the division of space is possible, but rather favor the view that division to any distance is impossible.

It appears certain that space is not divisible into any parts that are perceivable or imaginable, saying nothing of division into final parts that are extensionless or existenceless; and it appears certain that as space can not be known as divisible into parts of any size, it can not be known as made up, or as a

collection, of parts, or as in anywise a composition. Matter is divisible, and we have constant and unquestionable experience of dividing it; we can separate its parts and then can unite them; but have absolutely no similar experience respecting space. Wholly unlike matter, space is not a *compositum,* but a *totum.* Metaphysicians sometimes seem to affirm that the division of space into parts that are spaceless or non-entities — this "absolute completeness of division" — is a demand of reason. Facts warrant us in believing that it can be only a demand of fanciful and dogmatic idealism.

The old and obstinate metaphysical postulate, that not any extended reality can be a unit, would seem to meet with a decisive refutation in the facts that, though the divisibility of space to any extent is predicable, yet any division is unimaginable, an instance of actual division is absolutely unknown, and the assumption of possible division is absolutely groundless. By these facts we seem to be required to maintain that space is an extended unit. And even if space should have only phenomenal existence, it possesses both extension and unity. Apparent division of space into parts of any magnitude has never been experienced by any human mind. Space always appears as an extended unit.

There may be other extended and unitary entities. The luminiferous ether, which is supposed to fill space, may be an entity of that character. Division of the ether is not known to be actual or possible; and division may be impossible because of its essential unity. If the human mind is an extended reality, why may it not be a unit? Division is indeed predicable of the extended mind, as it is of space and every other extended thing; yet though predicable, and in that sense ideal, real division might be always impossible — the mind might still be actually an extended and indivisible unit. It may be said that each part "is in its own place"; still, because of indivisibility and simplicity, the whole, or the whole of consciousness, may be in each part.

We come now to the most important point in our present theme, namely, the total falsity and worthlessness of the reasoning of metaphysicians from the ideal division of space to the unreality and incognizability of space. The possibilities, and the "alternative impossibilities," of the ideal division of space determine nothing at all in regard to the reality and the cognizability of space. Why should the inability of our thought, respecting divisibility, prove anything more than the inability respecting the full extension of space (which, as we have seen,

proves nothing), for the doctrine of Spencer, that space is "incomprehensible" and our knowledge of it "total ignorance." Even if we can not imagine and decide how far space or a portion of it is divisible, or whether divisibility has a limit or no limit, why should it be inferred from this inability that space is incomprehensible? Why are we not perfectly justifiable in the opposite inference, namely, that the assumed divisible space, while yet undivided, is comprehensible, that it really exists as we know it? And why should the incapability of our imagination prove that our knowledge is "total ignorance"? Why may we not maintain the contrary doctrine, that our knowledge is a true knowledge, that space exists as we know it and we know it as it exists? More reckless and sophistical argument than that of Spencer on this subject is hard to conceive. But we are not left to a mere balance or equality of probabilities as to the reality and knowledge of space. In the incontestable fact that there is no known reason in the world for assuming the possibility of dividing space to any distance or into parts of any size, we are afforded unrestricted liberty, as far as the divisibility of space is concerned, to maintain that space is comprehensible, and that our knowledge is not ignorance, but truth.

We may treat the reality and perception of space without any regard whatever to the question of its divisibility. In fact, to introduce this question is a disturbing and mischievous interpolation.

The same fatal defect and error characterize Mr. Bradley's teaching. He says: "Any space must consist of parts; and, if the parts are not spaces, the whole is not space. * * * Anything extended is a collection," etc. He supposes that space, by division, "vanishes internally into relations between units which never can exist"—which are unextended; is a sum of abstract relations, in which there are no units or elements related; is composed of parts that are not spaces; and concludes that space is evidently not real, but only a contradictory appearance, or a something which vanishes into nothing. This is surely an example of the most illogical deduction. No reasoning could be more unreasonable. The fruitful source of all this evil is the initial assumption, that a space must consist of parts and must be divisible. We need not dwell further on the total emptiness and baselessness of this assumption. Not the least proof can be drawn from any source whatever that space ever has been or can be divided into parts of any magnitude, or into final parts of no magnitude. All conclusions,

therefore, drawn from the assumption — as that space is a collection of parts, that it vanishes into a system of void relations, that it is a whole made up of parts that are not spaces, that it is a fictitious or contradictory appearance, or is now something and now nothing — are as baseless as itself. Space does not contradict itself, but only the metaphysician's thinking. Not space, but only the partition that is supposed to cause it to vanish, is unreal. And even if the division of space into spaceless or non-existing parts were possible in anywise ideally, this could not in the least prove that it is possible actually, and that space is therefore found at last to be composed of the unreal or "absorbed in a non-spatial consummation."

Further, as already noted, there is not the same necessity upon us to decide that one of the opposite impossibilities of thought respecting the division of space is true, as that one of the opposite impossibilities of thought respecting the extension of space is true. The extension of space must be either finite or infinite. Though either of these mutual contradictories is unthinkable, we know that one must be true, because we possess a positive knowledge of a relative volume of space; that is, we have something to begin with. But the divisibility of space must

not be either finite or infinite. There is no necessity, there is no reason of any kind, for choosing either of the unthinkable alternatives about division; because we have no knowledge whatever of the actual or possible division of space to any degree, or we have nothing to begin with; and this total lack of knowledge warrants the conclusion that division to any distance is impossible. This is an instance where of opposite impossibilities of thought neither must be true to reality, or where there is no real compulsion to accept either. Both may be equally and always untrue.

The attempt of philosophers to prove the contradiction and unreality of space, and the inconsistency and fictitiousness of our thought of space, from the two cases of opposite impossibilities of thought, namely, the one respecting the extension, the other respecting the division of space, constitutes a strange chapter in metaphysical speculation. Neither set of the opposite impossibilities nor both combined afford the least support to the conclusions drawn from them. Why should these opposite impossibilities of our ideality be supposed to settle anything decisively as to the consistency of actuality and knowledge? A fair consideration of the facts of experience cause such general statements as the following from Brad-

ley to appear quite capricious and absurd: "The infinity of Nature, its extension beyond all limits, we might call Nature's effort to end itself as Nature. It shows in this its ideality, its instability and transitoriness, and its constant passage of itself into that which transcends it. In its isolation as a phenomenon Nature is both finite and infinite, and so proclaims itself untrue." * Space "made an effort to find and to maintain a solid self-existence, but that effort led it away into the infinite process both on the inside [by division] and externally." † "Space can not come to a final limit, either within itself or on the outside. And yet, so long as it remains something always passing away, internally or beyond itself, it is not space at all." ‡

Not the slightest evidence is brought that space or nature ever in any degree passes away either externally or internally, or has any disposition to do so. All the evidence we have, all the experience, all the phenomena, point to the opposite conclusion of solidity and permanence. We cognize an immense volume of space, but we find ourselves incapable of comprehending all of it, we can not reach out to its extreme regions by any length and strength of

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* *Appearance and Reality,* p. 292. † *Ib.,* p. 222. ‡ *Ib.,* p. 36.

effort. But only sophistical verbosity can affirm that, because we can not know the maximum extension of space, our knowledge of the great sphere which we do know is not true knowledge, and that space is instable, transitory, always passing away.

Space does not pass away externally, and as certainly, even more certainly, it does not pass away internally by division. Beyond dispute, one of the greatest blunders of modern metaphysics is the tacit and confident assumption that as the division of space is predicable, it is and must be possible and actual. Nothing is more certain to us than that there is no known instance of the real division of space, and no known possibility of division under any conditions. The possibilities and impossibilities of our ideality respecting both the outward expansion and the internal division of space can establish nothing at all against either the reality of space as an actual indivisible and indeterminately extended entity or the true knowledge of a great volume of it.

There is little in the teachings of Spencer and Bradley, and of many others, concerning the nature of space that is not found before in Kant's discussions of the "Transcendental Æsthetic" and the "Antinomy of Pure Reason." Kant vigorously

affirms the ideality of space, denying it existence as a thing-in-itself, or as something outside and independent of the mind. He contends that it is a pure subjective form of our sensibility and is nothing apart from it. The following statements declare his position: "Space represents no property of things in themselves." "Space is nothing else than the form of all phenomena of external sense, *i. e.,* the subjective condition of sensibility, under which alone external perception is possible to us." "It is nothing so soon as we leave out the condition of the possibility of experience, and take it as something that belongs to the constitution of things in themselves." * "Space, with time, and all phenomena in both, are not in themselves *things.* They are nothing but representations, and can not exist outside our mind." † Space is not a property of things in themselves, of the mind or of anything outside the mind; it is in no wise a copy of any of them. It is but a subjective *a priori* form of sense, having phenomenal extension, but not real extension. It does not arise from experience, but precedes and conditions experience. It "lies ready *a priori* in the mind," ‡ an original form of sensibility.

* *Kritik der reinen Vernunft* (Hartenstein), p. 61, p. 63.
† *Ib.,* p. 347. ‡ *Ib.,* p. 56.

Under the term *Space* Kant includes both Space and Extension, that is, both what is commonly called pure space or space in itself, and that quality of objects by which they fill space, namely, their extension. He does not expressly note this distinction between the terms, nor use them with this discrimination; but it would have added much to the general intelligibility of his discussion if he had done so.*

Kant supports the ideality of space on two main grounds; of which the first is the necessity and universality of our judgments respecting space and of geometrical propositions. He remarks specifically, that we must think of space as tri-dimensional, that we can not think space away, that we can not think a limit to it, or must always think of space as having space beyond. He notes the necessity and universality of the geometrical proposition, that two straight lines can not inclose a space. Kant con-

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* Locke long before acutely and wisely suggested that, "to avoid confusion in discourses concerning this matter, it were possibly to be wished that the name extension were applied only to matter, or the distance of the extremities of particular bodies, and the term expansion to space in general, with or without solid matter possessing it, so as to say space is expanded and body extended." (*Essay*, II. xiii. 27.)

tends that the necessity and involved universality of these judgments prove that they are not empirical; for experience can never give necessary and universal cognitions;* but are synthetic judgments *a priori,* arising from the internal constitution of the mind. And space, therefore, as being the object of necessary and universal judgments, must be something in the mind, a form of intuition provided wholly from within the mind itself. It can not be something possessing absolute existence, existence outside and independent of the mind, and known by experiential or *a posteriori* knowledge; since such knowledge can not afford necessary and universal judgments.

Kant's tangled, sometimes over-subtile, and verbose, reasoning upon the necessity and universality of spatial judgments seems far from conclusive; but we shall not enter upon a minute criticism of it. The necessity of geometrical propositions appears to be involved in their simplicity. We hope to show, in the chapter on the Cognition of Space, particularly, that the compulsion on our thought regarding the extension of space is not an *a priori,* but rather an empirical, necessity.

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* *Kritik d. r. V.,* p. 75.

The second main support of the doctrine of the ideality of space Kant finds in the inconsistent judgments of reason respecting the extension and the divisibility or simplicity of space. He asserts the "contradictions of the general cognitions of reason," * the conflicts of the "transcendental ideas," the "fourfold antinomy." The first of these conflicts or antinomies concerns the extension of time and space. Kant charges that reason here equally favors directly opposite propositions, which are entitled thesis and antithesis; and that, in favoring such propositions, reason reveals its self-contradictoriness. The opposite propositions, as respects space, are these: (Thesis) "The world is limited in regard to space." (Antithesis) "The world is not limited in regard to space, but is infinite." † Kant argues that in asserting with like positiveness these propositions, which, as being direct opposites, can not both be true, reason falls into a "contradiction" or into a "natural antithetic"; there is "disunion in reason," "it finds itself hemmed in by contradictory judgments." He imputes to reason here also a "striving to extend its domain beyond the limits of experience." ‡ But the main and final

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* *Kritik d. r. V.*, p. 301. † *Ib.*, p. 304. ‡ *Ib.*, p. 330.

conclusion is, that this self-contradiction of reason is the result of treating space as a thing-in-itself; not as a phenomenon in the mind, but as something subsisting in itself apart from the mind and discovered by experience. The "fallacy" lies in this initial "supposition." * The fact that reason finds the antithetical propositions equally valid, shows that the dispute is about "nothing" or a "transcendental illusion." †

It seems certain that Kant does not report the facts of reason's conduct in this instance truly. The charge of self-contradiction and disunion of reason, and of its attempting to extend its dominion beyond the range of experience, and the conclusion to the necessary ideality of space, have all their basis in his false report. The facts appear to be these: Reason finds itself capable of comprehending a very great volume of space, a volume extending out, we may hold, to the fixed stars. In this comprehension reason is in no conflict with itself, but in perfect harmony. But in its very great and enlarging perception of space, reason is halted by a dilemma: it finds itself unable to perceive, imagine or tell whether space is at last finite or infinite. Yet in

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* *Kritik d. r. V.*, p. 356. † *Ib.*, p. 353.

this predicament it does not fall into self-contradiction or disunion. It does not contradict itself by declaring that both of the opposite alternatives are true, which they can not be. It does not strive to extend its dominion beyond the realm of possible experience by deciding for either of them. It just discovers its own weakness or the limits of its cognitive power. It finds that space is too great to be comprehended by it, that space extends too far for its perception to follow. Reason, then, may be charged with weakness, but not with self-contradiction or self-conflict; in its weakness or the limitation of its perception, it always preserves self-consistency and self-harmony. If, however, reason thus does not and can not treat the opposite alternatives with equal positive favor and in this wise contradict itself, yet in a manner it does show equal favor to them; not equal positive favor, but, if we may so speak, equal negative favor; that is, it acknowledges its equal inability to decide for either of them or for either against the other.

Further, according to this view of the facts, reason is not liable to the accusation of making a pretentious effort to extend its dominion beyond the limits of possible experience by deciding for both the inconceivable opposites or by deciding on behalf

of either. But though it can not go beyond experience by deciding pretentiously, or modestly and rightly, for either finiteness or infinity, yet it does go a step beyond experience, and that rightly; for though it can not apprehend which of the opposites is true, it yet knows this much or this little—it knows that one of them must be true.

Let us now consider the bearing of what seem to be the real facts in the case upon Kant's main conclusion, namely, that space is a subjective form of intuition and not a reality subsisting outside the mind and known by empirical representation. They afford apparently not the slightest sure support to the Kantian postulate of ideality. They are in no wise inconsistent with the contrary hypothesis, that space is an objective reality independent of our mind. The fact that reason can not positively decide for either of the direct opposites, finiteness or infinity, most certainly involves no opposition to the reality of the space that is embraced within the wide circle of our actual perception. It leaves room with perfect ease and consistency for the simple theory, that space is a reality too great for our perception. There is evident not the least contradiction either in space or in our thought. Only a relative portion of space is known to us, not all; and reason is

strong and self-consistent to a certain extent of knowledge, but then becomes impotent. There is apparent no force of opposition to the reality of the relative sphere of space known to reason, and to the rectitude and trustworthiness of reason as far as it has strength to go. There is surely no justification for saying that the relative space we know is "nothing" or a "transcendental illusion." But, finally, who can successfully maintain any such postulate as, that there should not and can not be a reality so great as to surpass the perceptive power of man; or as to bring or suggest to the mind antithetic impossibilities of thought respecting its extension; or as to convince reason at length of impotency? Who can prove that a part is not real because the great whole is not entirely comprehended; or that the inability of reason to ascertain whether a reality at its farthest extension is finite or infinite is ground for accusing it of self-contradiction and disunion?

In Kant's treatment of the second "Antinomy," which concerns itself with the divisibility and simplicity of things, he seems partial to the view that every extended thing must be composite and divisible, that no extended thing can be indivisible and unitary or simple. He appears to hold that

space is capable of a division to infinity or to nothing, like that of matter as stated in the following: "A complete partition, by which the real in matter vanishes either into nothing, or into that which is not matter, namely, the simple [unextended]." *

Matter, we all know, is divisible, although no one knows how far. But to liken space to matter as being divisible, or to affirm that space is to any extent divisible under any conditions, or that it is composed of parts, is without the slightest warrant in the universal experience of space.

We will not repeat the argument and condemnation already pronounced against Spencer and Bradley, the close followers of Kant, on account of their affirmation of the divisibility of space. They fell into the ditch; but they were led by Kant. Their briefer statements of the situation have an advantage. By the ditch we mean particularly the wholly unjustifiable assumption, that there is an actual divisibility of space corresponding to, or beside, the commonly asserted ideal divisibility.

Kant was deeply concerned with the question, "whether nothing but the divisible and transitory

* *Kritik d. r. V.*, p. 297.

exists," * "whether anything in the world is simple or whether everything must be divisible to infinity." † Space seems to be entitled to answer for itself: that it is divisible neither to an infinite nor to a finite extent; that it is simple; and as permanent as anything else, if not more so. The total lack of evidence that space is really divisible into parts of any magnitude should go for proof that it is not so divisible, and is not composed of parts. This lack warrants the assumption that space, unlike matter, is an extended unit or an extended simple reality. In space there seem to be combined extension, indivisibility, unity or simplicity, and permanence.

3. Another leading argument against the existence and knowableness of the realistic space is, that it has no attributes, and for that reason is incapable of asserting its existence, or of acting on us and thereby making its existence known. Many contend that to exist is to act. Mr. Spencer holds that, on the hypothesis of "objectivity," it is on this account impossible to represent space in thought as an entity. "To be conceived at all," he observes, "a thing must be conceived as having attributes. We

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* *Kritik d. r. V.*, p. 331. † *Ib.*, p. 341.

can distinguish something from nothing only by the power which the something has to act on our consciousness; the several affections it produces on our consciousness (or else the hypothetical cause of them) we attribute to it, and call its attributes; and the absence of these attributes is the absence of the terms in which the something is conceived, and involves the absence of conception." * Undeniably there is some cogency in this reasoning.

But we are not under the necessity of refusing every sort of attribute to objective space. It certainly has permanency. It has extension. Some, however, have vigorously opposed especially the propriety of ascribing extension to space. For instance, Mr. Spencer says, that to credit space with this "implies a confusion of thought. For extension and Space are convertible terms: by extension, as we ascribe it to surrounding objects, we mean occupancy of Space; and thus to say that Space is extended, is to say that Space occupies Space." †

It is undoubtedly important generally to distinguish space and extension, meaning by the former empty space, and by the latter the attribute of substances by which they fill space. Many discussions

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* *First Principles,* pp. 47, 48. † *Ib.,* p. 48.

of the nature and our cognition of space, as, for example, that of Kant, would have been much clarified by careful regard of this distinction. But in the discussion of the attributes of space itself, the distinction, it must be admitted, has little pertinency; for space and its extension are identical. Space is tri-dimensional extension or emptiness; and we are really incapable of saying what it is more than this. We are therefore compelled to admit that it seems preferable to say that extension is space than that it is an attribute of space. To affirm that space is extended is really but to say that space is space. So be it. In fact, space can not be defined except only by itself. There is nothing in existence simpler than space by which or by comparison with which it can be made more intelligible. Hence there is never any real need for any man's attempting to define space for the benefit of others, since no definition can make it plainer than it already is to every mind.

Notwithstanding, there may yet be more reason for saying that extension is an attribute of space than at first appears or is commonly admitted. Is there absolutely empty space? We generally suppose there is, or may be; but is it a fact? Space contains the atmosphere, and we suppose also the

ether conceived as immeasurably more extended. Who can tell whether it does, or does not, contain other diffused non-spiritual entities? We may carry our inquiry yet farther: Does space contain, or is it contained and constituted by, the extended unitary and indivisible spirit of God?

Whatever may be said of extension, there is a very important quality belonging to matter which certainly appears absolutely lacking to space, namely, force or activity. Space never moves, or acts, or resists. It never has a share in any interaction. Therefore the question may be well asked: If space is entirely forceless or inactive, how can it ever affect us and thus reveal its existence to us, how can we have any ground at all for affirming its existence?

This formidable difficulty seems to be met and perfectly dissolved by the principle, that we come to know empty space by means of filled space, that emptiness is primitively an inference from a previously known filling or extended substance which has gotten away.* Here may be fitly noticed a

* The like view is thus pointedly advocated by Professor Croom Robertson, *Elements of Psychology*, p. 109: "Historically, genetically, we apprehend Body as resisting before we apprehend Space as extended. We come to Space by the evacuation of Body rather than to Body by the filling in of Space."

remark of Mr. Bradley: "Empty space—space without some quality (visual or muscular) which in itself is more than spatial—is an unreal abstraction. It can not be said to exist, for the reason that it can not by itself have any meaning. When a man realizes what he has got in it, he finds that always he has a quality which is more than extension. But, if so, how this quality is to stand to the extension is an insoluble problem." * This doctrine is on a line with the following well-known utterances of Berkeley: "I desire any one to reflect and try whether he can, by any abstraction of thought, conceive the extension and motion of a body without all other sensible qualities. For my own part, I see evidently that it is not in my power to frame an idea of a body extended and moved, but I must withal give it some colour or other sensible quality which is acknowledged to exist only in the mind. In short, extension, figure and motion, abstracted from all other qualities, are inconceivable. Where, therefore, the other sensible qualities are, there must these be also, to-wit, in the mind and nowhere else." †

It is indisputable that we have no image nor

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* *Appearance and Reality,* p. 38. † *Principles,* X.

any sort of thought of pure and abstract space or extension, before and independently of the thought of extension that is more than extension, *i. e.*, of extension associated with some sensational quality, as color. And it is probably true that we never become able in any length of experience to image space or extension with every sensible or secondary quality abstracted. But these facts do not justify the conclusion that we can not treat or think of space as without sensational quality or as empty of everything, and that such space is an "unreal abstraction." Pure empty space is reached by thoroughly logical inference; it is an object of true knowledge; it is a real and not an "unreal" abstraction. But we shall not attempt here to treat this subject with minuteness; for this would carry us too far into the question of the process of our cognizing space, and that question we wish to reserve for separate consideration. Now we are mainly concerned with the nature of realistic space, or with the self-consistency of space and of our thought of it.

Our first and fundamental knowledge of extension is in the consciousness of extended sensation. There is certainly not an original knowledge of extension or space before or apart from sensation of

some quality. We have not an *a priori* or primitive abstract knowledge of space. Our first knowledge of extension is of the extension of sensation. It is our first knowledge of filled space. The first filling for us is sensation, and it is indispensable. And this knowledge is fundamental. It is the necessary ground of all our knowledge of external extension, of all extension filled and empty outside and apart from the region of our sensations. The first known external extension is the extension of material objects directly impressing us. We infer the extension of the external objects by means of the extension of the sensations they excite in us. The internal sensation is a sign and representation of the external extension. Thus, on the basis of the internal extension we cognize the external. It seems possible to prove, against the Berkeleian idealism, that this is entirely legitimate reasoning and that the result is knowledge true to actuality. From the knowledge of external extended bodies or filled extension we go on to the knowledge of empty extension or space. Many and varied experiences of losing objects from the embraces of our organs, as by being snatched or being dropped from the grasp of the hand, lead to the inference of the empty spaces left by the objects. Our organs, previously

resisted by the objects, can close within the vacant places, and thereby come to prompt the inference of the existence of the vacant places. We miss the filling, and infer emptiness. We know space not by its own force or resistance, but by the absence of previously known resisting bodies. Thus without miracle or mystery we may attain, by repetition and composition of experiences, to the clear cognition of the contrast between filled extension and empty extension. This reasoning seems to be logical, and to warrant the judgment that it is an unjustifiable assumption of great moment to declare empty space, as thus knowable and known, to be an unreal or impossible abstraction. Such space may not be picturable or imaginable, apart from secondary quality, but it is yet truly thinkable; and there seems to be no sufficient reason why we may not continue, if we care to do so, to hold it really to exist, in its absolute inactivity, as it is thought to be.

This view of the cognition of the reality of empty space is not contradicted by any characteristics of our thought of space; as, for instance, by the peculiar necessity pertaining to it. This necessity, as our inability to imagine an end to space and divisions or vacancies within space, is apparently easily explicable by the ordinary powers and logical

processes of our mind as these have just been in part described, without requiring us to assume an extraordinary innate or creative function, or *a priori* determination, in mind, or requiring us to yield in the least degree to the dogmatism that insists that empty space must be unreal or only a phantom or abstraction of thought.

4. Some have argued against the reality of objective space—against space considered as an entity external to and independent of the mind—on the ground that this is to introduce duality into fundamental existence, or to contradict "the necessary unity of the basal reality." It requires, they say, that God should be extended; but it is impossible for God to be extended, for if he be extended he can not be a unit, since "nothing possessing volume in space can be a unit." Or it requires, that space should be a reality co-eternal with a spaceless God.

Metaphysicians have been too long and too generally dominated by the dogmatic hypothesis, that unity is impossible to an extended reality; and frightened or offended at the imputation of extension to the Supreme Being. But whatever may be the relation of God to space, or of space to God, it is not necessary for us to discuss or have regard for

this relation in considering the reality and nature of space. We may conduct this consideration and come to trustworthy conclusions without being obliged to treat of that relation. It is important to observe and to maintain this position; for one of the greatest errors, and a necessary one, of idealistic monism is looking at space and other realities from the supposed point of view of the divine mind, and depreciating and ignoring, if not defaming, the point of view of the human mind. This is a necessary error, for it proceeds inevitably from the primary assumption of the identity of the divine and human minds.

We may consider space from our human position, or its relation to the human mind and of the human mind to it, without necessarily taking account of the relation of God to space. We may take account of this relation or we may not, just as we choose or our ends call for; but may reach truthful results as to the nature of space and our relation to it, without taking account of it. The relation of God to space is, no doubt, an important subject of metaphysical philosophy; nevertheless, we must maintain that, with all its importance, it should not dominate our study of the nature of space and human relation to space, and determine

and prescribe the conclusions. Because space is as near to us in knowledge as God is, and our knowledge of it is not less direct and certain than of him. It may be contended that our knowledge of space is more direct and certain, and therefore must not be made dependent upon the knowledge of God. We might then even hold as an implication of these principles, for instance, that if our human knowledge of space involves the inference that God is extended, the inference is probably true. We can not, on the contrary, be logically and justly compelled to reason in the opposite direction and conclude that, as we think of space, God is spaceless, and space must be unreal, or of very inferior reality, or only a fictitious appearance. We should hold on to the reality of space and the truthfulness of our earlier and nearer knowledge of it, let the ulterior results be what they may. What we know first and immediately must not be made to agree with what we know last and by the farthest deductions; rather, the latter knowledge should agree with the former. Idealists pursue the opposite course with respect to space and everything spatial and temporal. Their method tends to remove us from the true foundations and beginnings of our

knowledge, and to reduce the science of ontology to chaos. We must not, indeed, deny the truth in the words of Professor James, that "philosophy is essentially the vision of things from above"; * but we must not deny the equally important truth, that the vision of things from above must preserve consistency with the vision of things from below.

But if there is, as there certainly seems to be, a real duality between the human mind and space, we are not logically bound to hold to a real or the like duality between God and space. Man exists in space and is entirely dependent upon it. Space is absolutely independent of him and his thought for its origin and continuance. This he well knows. He may move hither and thither, but space in all its parts abides constant, unchangeable. He can not divide it or affect it in any way. He can not move it or move it away actually; he can not even think it away. It holds its place persistently and invincibly against him and his thought. We are under no logical necessity of maintaining a like dependence and inability of God. We may legitimately believe that space is entirely dependent upon him

* *A Pluralistic Universe*, p. 277.

for its origin, and entirely dependent upon his immediate and constant support for its continuance. God may be said to be in space, not as dependent and uncreative man is, but as having given space existence and as by his omnipresence eternally sustaining it.

CHAPTER II.

OUR COGNITION OF SPACE.

In the preceding chapter, devoted to the consideration of the Reality and Nature of Space, we have found that the most notable arguments employed against the self-consistency and reality of space are so singularly errant and indecisive that, as far as they are concerned, we are left entirely free to maintain the ordinary view that space is not a self-contradictory phenomenon, but a self-consistent reality — a real extended unitary, permanent, inactive, empty entity, of indeterminate extent. We now proceed to consider the question, how we come to a knowledge of this reality, or whether there is an actual and trustworthy process of cognizing an external space so defined. Something has been already said in the former chapter upon the process of knowledge, because of the difficulty, arising from the close relation of knowledge and reality, of treating of either entirely apart from the other. What is real for us must in some way be known by us. A thing is real for us because it is known.

It is now maintained by many psychologists,

and, as it appears, rightly, that we have no original abstract or *a priori* knowledge of space, or innate knowledge preceding or independent of experience; but that we attain to a knowledge of space only by means of our sensations or sense-experience. An important question arises here, and indeed the most important question pertaining to the cognition of space, namely, Is our first knowledge of space or extension attained by means of sensations that are in themselves unextended; or by means of sensations that are in themselves really extended, that possess extension as an original attribute? Many psychologists vehemently argue for the former alternative; a less number as vehemently argue for the latter.

Some psychologists impute what they call "voluminousness" or "extensity" to sensations, particularly to the tactual and retinal; and treat it as an element of importance in the cognition of spatial extension. But their "extensity" is in many cases of an equivocal and uncertain character.* They

* Mr. F. H. Bradley says: "What has been called 'extensity' appears to me in the main to consist in confusion. When you know what you mean by it, it seems to turn out to be either spatial at once and downright, or else not spatial at all. It is useful, in short, only as long as you allow it to be obscure." (*Appearance and Reality*, p. 35.)

will not admit that it is real extension or in itself involves the consciousness of real extension; and hold that other, namely, motor sensations must be incorporated with it in order that there may be the perception of extension. The cardinal question, how motor sensations, if they are to be regarded as in themselves unextended, or as constituting a pure time series without any extension, can cause the conjectured "extensity" to appear as extended, is too frequently left in dense fog or ignored.

A larger number of psychologists have made no mention or use of "extensity"; and have expressly denied that sensations of any sense are really extended or afford in themselves alone the consciousness of real extension. They contend that extension or the thought of it is the result of a creative synthesis or fusion of different sorts of unextended sensations, of surface sensations with motor sensations—those of muscle, joint and tendon—or with feelings of central innervation. The spatial order in both touch and sight, says Wundt, "is developed from the combination of certain sensation components which, taken separately, have no spatial attributes whatever." * It is sometimes said

* *Psychology* (Judd tr.), p. 142.

in general: "We make space in the knowing of it. We know it in the making of it."

The hypothesis of genetic synthesis and transformation as variously advocated, especially by German and English psychologists, seems to be of the most unsatisfactory and delusive character. For example, it is taught that a series of sensations on the tactual surface excited by the movement of a finger-tip over the surface is made into a spatial series by means of or by fusion with the motor sensations of the hand or arm that attend the movement of the finger. The tactual series is held to be composed of sensations originally different in quality and thereby constituting a series of "local-signs." But though different in quality, the tactual sensations are, it is distinctly said, not at all known in themselves as forming a spatial series, or as separated by intervals of space. Likewise the muscular or motor sensations accompanying the motion of the limb are not known originally or by themselves as a spatial series, but only as a pure time series without any spatial property. Then by combination the qualitatively different and purely successive sensations are transformed into or caused to appear as a spatial series; "sequent positions" are made into spatially separated positions, sequence into exten-

sion. The process amounts to a creation of the extended out of the unextended, of difference of space out of difference of quality and of time.

But it seems impossible to admit that there can be thus a development or genesis of spatial order from pure qualitative and temporal order. The fusion of the spaceless elements is no sufficient reason for the generation or appearance of the spatial. It is arbitrary presumption to impute such an effect to such a cause. The proper conclusion would seem to be that, as only spaceless components go into the fusion, only a spaceless product can come out; that a union of pure time series of sensations can only result in a composite pure time series; that if spatial separation and extension are found in such a union it can only be by unconscious surreption.

In the rise of the spatial series from the temporal much importance is imputed by some to the reversibility or "double-sided reproduction" of the temporal series. But it appears altogether fanciful to suppose that reversion or any mode of reproduction of originally pure time series can be of moment in the genesis of the spatial. For the reversion of a pure time series is still a pure time series, it has yet absolutely nothing of the spatial in it, and can not carry us a hair's breadth towards the production

of the spatial. In the direct and reversed sequences there is nothing but the union of the two modes of pure sequence. The two fill twice the time filled by one, but they can produce no spatial extension or the thought of it. If the spatial enters it can do so only stealthily amidst the multiplicity and variety of experiences of the direct and reversed sequences.

It should be observed that in their accounts of the genesis of the spatial, psychologists differ as to the relative importance they assign, on the one hand, to the qualitatively different surface sensations, and, on the other, to the motor sensations (the muscular, articular). Qualitative differences of surface sensations, as the tactual, are generally admitted to occur, and that, too, even within very narrow circles; and they may be properly called "local-signs," if this term does not serve as a means of bringing in surreptitiously spatial place and extension.* Now some psychologists, in the explanation of the perception of difference of place and motion, reckon very great importance to qual-

* Though the word *local-sign,* which was introduced into the discussion of space-perception by Lotze, may have its proper use, I have avoided it; because of its varied and uncertain applications, and especially because, as employed by many writers, it is a smuggler, and is well-compounded for the office.

ity-differences, even deeming them almost or quite sufficient in themselves. They say that "if two excited points awaken identical qualities of sensations, they necessarily appear to the mind as one," or that "if two sensations are not distinguished as to quality, they are not localized apart." "Qualitative shadings are transformed into spatial series." This doctrine is quite extreme and not sustained by experience. While quality-discrimination and place-discrimination are in the closest union in many instances, there is no certainty that the former occurs with the latter in all cases, or that the latter can not occur where there is identity of quality or occur independently where there is diversity. Again, the unlikeness between quality-difference and place-difference is so wide and marked that there appears no real ground for assuming that the knowledge of the former begets or is indispensable to that of the latter, or that there can be a causal connection. Quality-difference is probably no more necessary to the perception of an interval of space than to the perception of an interval of time. The utmost we seem to have warrant at present for asserting is, that quality-difference has importance in rendering the spatial consciousness more acute, more definite and vivid; but not in generating the

spatial consciousness. Difference of quality and difference of space appear to be two original facts of experience, radically and eternally unlike; and neither can be said to be derived from the other, or to be necessary to the other.

Other psychologists assign the principal function in the genesis of the spatial consciousness to the muscular sensations accompanying the movement of our organs. It is said that a temporal series of muscular sensations constitutes a spatial distance. "The experiences from which the consciousness of space arises are experiences of *force* [muscular sensations]."* These sensations are sometimes called "movement," "active movement." "To account for the spatial order we must have active movement as of the eyes or hands." Some assert, in other words, that muscular sensations give massiveness, or are themselves spatial in character.

But the muscular hypothesis is liable to the gravest objections. In the first place, it seems impossible, for example in the case of the movement of a finger-tip over a tract of the cutaneous surface, that sensations up in the arm attending the movement should involve or give an original knowl-

* Spencer, *First Principles,* p. 165.

edge of the places touched, of their distances, and of the path traversed by the finger-tip. How can they cognize distances and movements that are so far away from themselves? The muscular and articular sensations may originally reveal their own places and their extension within their own seats; but how can they originally know distances and movements when they are not spatially present to them, when they are so far absent? It seems a clear impossibility.

Again, the muscular sensations accompanying movement are generally assumed to be and to be known originally as a pure time-series. Then we have the capital problem, how does the time-series become a space-series, how are "sequent positions" transformed into spatial positions, or time into space? The answer of the devotees of the muscular sense is in most cases a prodigy of surreption and paralogism; or their dependence is upon the secrecies of magic. A series of muscular sensations which is, or which is known as, originally a pure time-series, and occurs with a succession of two tactual sensations aroused at separate points by two contacts of a finger-tip, can not be rightly supposed to cause the tactual sensations, which in themselves are known only as purely successive, to be, or to

be known as, apart in space. A time-series can not reveal or impart what it originally entirely lacks; or receive from another what it originally entirely lacks. We have a pure time-series of motor sensations intervening between two tactual sensations. Now the intervening series may well measure the time interval between the tactual sensations, but it can not create or cause to appear a space interval between them. It is incredible that out of experience of pure sequence there should arise so different a notion as that of separation in space.

Spatial extension is surely as original as time, and our knowledge of it as early and original as that of time. The two experiences are always most intimately associated; but it has never been demonstrated that the spatial is derived from the temporal. We must hold to the general conclusion, that difference of quality, difference of time, and difference of space are three distinct original differences. Known usually in the closest relations of each with the others, they are yet radically diverse. Not one is derived from either or both of the others.

The illogicalness and fatal shortcomings of the spatial theory of creative synthesis or genesis of the extended from the unextended seem, from the above considerations and the like, to be indisputable, and

I shall therefore not pursue the discussion of it further; but prefer to turn now to the examination of the alternative theory already mentioned. And I may excuse myself from further discussion of the genetic theories, because I have already treated of them with some minuteness and fullness in previous publications.

We have remarked that the chief question regarding the perception of extension or space is whether our sensations, which are the indispensable means of perception, are in themselves originally extended or unextended. The apparent entire failure of those who, holding that the sensations are all originally unextended, have attempted to account for the knowledge, or for both the origin and the knowledge, of extension by means of a creative association of different kinds of unextended sensations, or genetic process, may well induce us to consider the cognitive theory and success of those who begin with the postulate that the sensations, especially the cutaneous and retinal, are in themselves really extended, possess extension as an original property, and as such are primitive elements of knowledge.

It seems necessary to admit the truth of the

basal postulate, that some at least of the sensations, particularly those first concerned in spatial perception, possess extension as an original, underived property. The consciousness of extended sensations can not be proved to be anything else than a primary fact of experience. It is original and unique. It appears to be as early, as original and as sure as the cognition of pure temporal sequence. And the primitive consciousness of the extension of sensation is not merely of a mongrel or uncertain "extensity," but of real, unequivocal extension. It is true that our first experiences of sense-extension are vague and indefinite as to outlines and internal points and distances, but they are yet of genuine extension; and experiences grow rapidly in definiteness and clearness by repetitions, increase of variety and memory. Further, there is original consciousness, not only of linear and superficial, but also of trinal extension. We are conscious of trinality or voluminousness in the head, and in limbs and parts as they are embraced and compressed.*

* "The sensations derived from the inward organs are also distinctly more or less voluminous. Repletion and emptiness, suffocation, palpitation, headache, are examples of this, and certainly not less spatial is the consciousness we have of our general bodily condition in nausea, fever, heavy drowsiness, and fatigue. Our entire cubic content seems then sensibly manifest to us as such." (James, *Psychology,* II. 135.)

Our first cognitions of extension are then of the extension of sensations. There is no preceding *a priori* knowledge of abstract extension, or knowledge of extension which is the extension of nothing; but our first knowledge is of extension which has sensation as content. The primary condition of knowing that a sensation is extended is its own actual extension. There is no *a priori* or innate idea or form, unless the actual and original extension of sensation, or of consciousness, or of mind, should be called such a form.

The earliest perceptions of extension are of the tactual sensations. They are at first at least the most frequent and most prominent. The tactual surface is from the beginning fully exposed and ready for impressions or irritations. Two sensations in any portion of this surface are known as spatially apart, by means of intervening sensibility aroused by pressure of an extended object or by radiation of the stimulation that excited the two sensations. But we do not suppose it is impossible for two sensations to be known as two and as spatially severed if they are not connected by intervening clear feeling. Qualitative differences no doubt aid in the perception of the numerical and spatial differences of sensations; but they are not

essential or indispensable; and probably they are generally not as strong as is sometimes assumed. The one indispensable condition of our cognizing two sensations as apart in space is that they shall actually be apart in space. The ultimate ground of the experience is, we may presume, that the sensitive principle itself is an extended and indivisible unit. Because of this character it is capable of continuous sensation, when, on account of the atomicity of the physical organ, the excitation is discontinuous; and capable of embracing in one momentary knowledge separate sensations. Two sensations excited in the palm of the hand by a pair of compasses and known as apart, are the punctual experiences of a unitary extended consciousness. They may be compared to two candle flames in daylight, or to two brilliant points in an illuminated surface; and nothing more than the condition of their separation would seem to be required for the perception of them as two and as apart, even if they had no discernible qualitative difference. Such difference has importance, as above remarked, in rendering the spatial consciousness sharper, more vivid and definite; but not in creating it.

On the fundamental postulate that extension or "voluminousness" is an original property of sen-

sation, Professor W. James seems to maintain that two stimulated points of a sensitive surface are originally known as apart in space, by means of sensation or feeling—a positively extensive whole—which fills the interval between the two points and which is awakened by the irradiation of the stimulation of the points.* But he gives an importance to the difference in quality of the feelings of the two points, or to the "local-signs," which, on the theory of the extended awakened feeling of the whole tract that embraces the points, is uncalled for. He says that two sensations identical in quality can not be known as two; and of course, then, they can not be known as apart in space. "The twoness of the points comes from the contrast of their local-signs." † But it seems more reasonable to maintain that two punctual sensations, tactual or retinal, are known as apart in space, primarily, because they *are* apart in space and the interval between them is filled with aroused feeling, and not because they differ in quality. Difference in quality has its only or chief importance, not in causing the consciousness of duality and spatial severance, but in making, by contrast, the consciousness more exact and vivid

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* *Psychology*, II. pp. 153, 159. † *Ib.*, II. p. 159.

and in helping the clear discrimination of widely separated localities. The sensations are parted and known as so by the actually extended intervening feeling. They are bright spots in a conscious sense-expanse, and might be known as two if absolutely alike. The knowledge of them as two and as apart is involved in the knowledge of the extensive unitary sensation within which they stand. If we are conscious of extended feeling, why should we not be conscious of two separate sensations within the sphere of that feeling, even if they be the same in quality? The reckoning of so much importance to differences of quality is too closely allied to the sophistical hypothesis, that difference of place in space, or extension, is generated from sensational difference of quality or of time or of both, and that there is not extended sensation to begin with.

By the comparison, union and memory of variously extended, limited and situated sensations (all being within the body), the mind comes gradually to a knowledge of the whole sphere of extensive sensation as a unity. The primitive vagueness and indefiniteness grow to clearness and precision. Qualitative differences give help. Underlying all is the unity of the mind and consciousness. The one mind holds together all its extended sensations

occurring in separate corporeal limbs and parts and gives spatial unity to them. All their distinctions of place are unified as being embraced by the one mind. Further, in the development to clearness of the tactual experiences, by repetitions, growing multiplicity and comparisons, the mind comes to what may be called the knowledge of absolute extension and the possession of an absolute standard. Different regions of the tactual surface differ greatly, no doubt, in fineness of sensibility, so that two impressions must be much farther apart on one tract than on another to be discerned as two; but this fact does not interfere with or make impossible a fair uniformity of estimate of those distances between points that are long enough to be perceived at both the acuter and duller parts, and of all tactual distances.

It may be observed, by the way, that some psychologists apparently assume implicitly that, if there be original apprehension of positions in space and distances by the tactile sense, the apprehension should be perfect in exactness, vividness, and comprehensiveness from the very beginning; and that there should be no development from vagueness and indefiniteness by means of repetition and practice, associated sensations and perceptions, etc. This is

one of those singular presuppositions by which psychologists sometimes gratuitously increase the intricacy and difficulty of problems and increase their own labors. Time is required for the mind to become fully awakened out of its original profound unconsciousness — to become vividly sensible of itself, its constitutional attributes, its potentialities. Development in exactness and clearness of perception of tactile places and extensions is the progressive awakening of consciousness. It is a growing familiarity with sensations and their positions; an increase in the holdings and tenacity of memory; a confirmation and establishment of associations and relations. Discrimination of places by touch progresses from obscurity and vagueness to clearness and precision especially because placing a sensation consists largely in relating it to other tactual sensations present and remembered. A solitary primitive punctual sensation may be compared to a man trying to find his place in a strange and dark space into which he has been carried while asleep. To know the place of a tactual sensation is to know its spatial relations to others. But this requires multiplicity of experiences, and some development of the tenacity of memory and power of comparison, and therefore requires time. These

provisions are requisite also because the mind has no aid from actual *a priori* or inherited knowledge; although it is very probably helped by inherited tendencies or dispositions. We may note further that as time is necessary to come to clear consciousness of the place and relations of a tactual sensation, so time is necessary for a sensation to loosen itself from its original place and relations. This is exemplified by what occurs with the Taliacotian operation, in which a flap of skin is turned down from the forehead in order to form an artificial nose. For a while sensations excited in the piece of skin in its new position are felt as if in the old position on the forehead. This probably results from the overpowering influence of their old associations, which continue for some time or until the new relations are well formed.

We have been hitherto concerned mainly with the perception of positions and extensions of our sensibility, especially the tactual sensibility. These are within the confines of the body. Now we proceed to consider the difficult and very important question, how perception goes beyond the body or tactual horizon and apprehends the outside extensions and spaces from the small to the great. The problem is double: to understand how we perceive

extension that is both beyond the corporeal boundary and empty—empty of sensation and every apparent content.

Already we have accepted the principle that, because of its entire inactivity, pure space can not be known to us directly, but only indirectly, mediately, by means of active or resisting objects that occupy it. It is then obvious that the question of the cognition of external extended objects or occupied space should have precedence to the question of the cognition of external unoccupied space.

How we come to know external extended objects is too important a question pertaining to the present subject to be passed over or entirely postponed; but here we shall treat it with as much brevity as possible, desiring to reserve a more particular and full discussion for a future occasion.

The leap of perception from the cognition of the extension of the internal sensation, the first extension we know, to the cognition of the extension of external reality, unquestionably constitutes one of the most important epochs in our progressive knowledge. A fundamental condition is the previous experience of the mutual pressings and compressings of our bodily organs. When one organ, as the hand, embraces another, we have experience of

double effort, or of effort and resistance, and of double extended touch. This is experience of reciprocal causation and extended sensations wholly within the sense or mental sphere. Afterwards, when the organ happens to strike or grasp an external object, and we have experience of only single effort and single extended touch, we are therein prompted to the inference of an extended resisting object that is not one of our organs, but is outside the bounds of our sensation and will. We infer that the resisting object is external, on the ground or suggestion of the preceding experience of reciprocally external sensations; and that it is extended, because of the extended sensation it excites in the grasping organ. If the object excited not extended, but only unextended, sensation, we could not conclude that it was extended. The unextended would be no medium for inferring the extended. Inferring the extended from the unextended would be impossible. We may hold in general that if there were no real and known sensation-extension, we could never perceive or even dream of extended reality outside and beyond.

By such contrasted experiences repeated, multiplied and memorized, our perception is gradually induced fearlessly to make the marvelous leap from

the ground of extension within the sphere of sensation to extension beyond it and the periphery. This, the first move in our perception of outside extension, is also by far the most difficult and important. When it once has been made, there does not seem to remain any very formidable obstacle to the progress of our perception to the great extensions and immense volume of space we come at length to know. I am not unaware how strongly and scornfully adverse are idealists to any such theory of perception of external objects as that here imperfectly outlined; but I beg their permission to uphold the theory notwithstanding.

If we may attain in such a manner as here described to the perception of external occupied space, by what course do we reach the cognition of external empty space? The course has already been indicated in the preceding chapter. It is a process of inference; but it is not an intricate and obscure process, and does not require minute and prolonged consideration. We infer empty rooms from the escape of extended objects out of our grasp. We first come to a degree of familiarity with external filled spaces or objects. By the repeated escape of objects from our hold and the contractions of our

organs, we infer the existence of the empty and unresisting spaces which the objects filled. The inference at first slow and vague, becomes easy, quick and clear; and we acquire as much familiarity with empty space as with occupied space.

But in our discussion of the perception of external extension filled and empty, we have not got beyond small and near, tangible objects and the nearest space. The serious problem yet remains, how are we able to cognize objects of great extensions and great distances, and space of remote and immeasurable expansion? This perception of near space may be the true beginning of what enlarges at length to a clear knowledge of a vast volume of space with its unity, continuity, homogeneity, and necessity; yet we still have to ascertain the means and mode of the enlargement.

The chief means are the muscular and visual senses;—the muscular sensations accompanying the movements of the locomotive organs, the arms and legs, and the retinal and muscular sensations of the eye;—both these senses operating, however, upon the tactual sense as a basis. By the tactual sense alone we acquire no cognitions of extensions beyond the corporeal superficies; but by the coöperation of

especially the muscular and visual senses with the tactual, we apprehend all the external extensions, distances and motions we ever come to know.

The muscular sensations occurring with the movements of the arms and legs advance our knowledge of external magnitudes and space considerably beyond the corporeal boundaries. The muscular horizon, so to speak, is much wider than the tactual. But the muscular sense does not attain this knowledge by its own original faculty of perceiving movement and extension. It does not know of itself the motion which excites it and which its temporal serial feelings accompany. We have already contended, and continue to contend, that the muscular sense has no original capability of perceiving distances and extensions away from the muscles in which it is resident. The capability is altogether an acquisition, and an acquisition made at first by association especially with the tactual sense. By this association muscular sensations become able to serve as signs, tokens, of distant movements and extensions. This service is our cognition by the muscular sensations of the movements and extensions. Other motor sensations, those of joint and tendon, are generally united with the muscular in the cognitions.

When a finger-tip is moved, in the motion of the arm, over a tract of skin, the muscular sensations up in the arm, occurring with the motion of the arm, are associated with the tactual sensibility aroused by the transition of the finger. By this association they acquire the ability to indicate the tactual extension traversed. They are aided in the acquisition by the sensation at the end of the finger. Thus, primitively, muscular sensations become capable of acting as signs of tactile extensions which are known originally and independently by the tactile sense itself; and thereby acquire a power which serves as if it were an original endowment. On this theory we may contend that the advocates of the muscular hypothesis of the cognition and production of spatial extension just reverse the order of nature. Instead of touch cognizing extension from the muscular sense, the muscular sense cognizes, by the tuition of touch, extension originally known to touch.

The muscular sense improves and greatly enlarges its acquired power. 1. It first repays its indebtedness to touch by helping touch to a more exact, definite and clearly comprehensive localization and measurement of its sensations, extensions and distances. It is an important factor in our first

cognitions of empty spaces from touchable objects near to and impressing the superficies. 2. The muscular sense improves its acquired power by the attainment of a finer discrimination of places and extensions than that possessed by touch. For instance, it can discern places on the superficies which are too near one another to be discriminated by touch. If the fine point of any instrument, as a pencil, held by the fingers, be moved over the skin, we distinguish places which are too close to be distinguished if they be impressed simultaneously by a non-moving body. This finer ability for spatial discrimination possessed by the muscular sense has, however, been thought by many to afford strong proof that the muscular sense does not borrow from the tactual, but is rather itself, by its own original endowment, the leading sense. This conclusion is not warranted. The muscular sense improves on touch, by means of its original fine sensitiveness to changes in time or to the succession of the terms of its own serial experience. Its sensitiveness to changes of feeling in time is finer and clearer than touch's sensitiveness to differences of place. In the movement of the pointed instrument the muscular sense cognizes change of time, when touch does not

cognize change of place. By this original faculty for time, then, the muscular sense can divide spaces which it originally learned to measure from touch, but which touch itself does not divide because of its dullness. The series of sensations of movement which become a measure or sign of the least distance perceptible by touch, or the *minimum tangible,* on any portion of the skin, can be divided, and a part of the series can become the measure or sign of a part of the *minimum tangible.* In other words, the superiority of the muscular sense to the tactual in delicacy of spatial discernment is its superiority to the latter sense in the minute division of the extensions which were originally known to the tactual, and which the muscular sense, by association, learned from it.

3. The muscular sense of the arms and legs improves on touch by its apprehension of larger extensions. Having acquired by association with touch the knowledge of movement and a standard of measurement, it becomes able in the free motions of the organs to reveal spatial magnitudes far greater than the tactual experiences, and than could ever be known by the tactual sense alone. A certain duration of muscular sensation indicates a certain

extension (as a tactual) or space; a continuance of sensation indicates a continuance of space or a larger space.

4. It should be observed that, because of our habitual dependence on the muscular sensations of movement in the perception of extensions and spaces, injury of the muscles, or derangement of the muscular sensibility, causes notable mistakes and illusions in spatial cognition.

The main agency for our largest perception of space is the visual sense. The horizon of the visual sense is vastly wider than that of the muscular sense of the locomotive organs. By it we penetrate into the abysses of space, immeasurably farther than any other sense or senses can carry us. Yet it is to be remarked that the visual sense has no original perception of depth and solidity. It has original knowledge of only linear and superficial extension, in its retinal sensibility. And also the muscular sensations of the eye, like the muscular sensations of other moving organs, afford in themselves, originally, no knowledge of distant extension of any dimension. The eye acquires the power to perceive the third dimension and solidity by its retinal and motor sensations, primarily through association of them with touch and the muscular sensibility and

movements of the arms, legs and body. The visual sensations, retinal and muscular, thereby become signs of extensions and spaces cognized by these other senses. But sight attains to an astonishing development and use of this acquired power, and also of its own original power. It perceives much finer, more exact and definite extensions and immeasurably greater space than ever could be cognized by touch and by all motor sensations other than its own. First, it repays its obligations to touch by aiding touch to more exact and precise cognition of its own places, extensions and totality. There can be no doubt of the assistance given to touch, and also to the motor sensibility of the arms, by the visual image or chart of the body.* But further, and in general, vision has a notable faculty

* The experiences of persons born blind confirm the Berkeleian doctrine that touch is not dependent on vision for its first knowledge of the superficies. Such persons acquire apparently clear notions of locality on the body. Helmholtz says that "the sense of touch is sufficient, as experiments upon persons born blind have proved, to develop complete notions of space." (*Popular Lectures on Scientific Subjects* (Atkinson), I Series, p. 271.) It remains true, however, that, while vision does not have an original knowledge of the outlines and of particular spots of the skin, and does not lead touch to that knowledge, yet vision just as certainly helps to perfect the knowledge.

of using its own sensations as signs of the tactual, and of the corporeal movements; and of forming representations of great extensions and spaces, by forming representations of great combinations and associations of tactual and motor experiences. A certain width of its retinal sensation, and duration of its muscular, represent an extension known by other senses; a greater width and longer continuance of sensations indicate an extension vastly greater than could ever be cognized by other senses alone.*

But the fact should be noted that, notwithstanding the great superiority of sight in spatial perception, it ever remains subject to important control by touch. For instance, (1) sight always measures by the standard of touch (the real and true standard because of the immediate impression of objects upon the cutaneous surface); (2) it perceives objects erect (as they are to touch), although

* We presume yet that the retinal sensations possess extension in two dimensions as an original property. These original small extensions become easily by association representatives and signs of the much larger tactual and muscular magnitudes and measurements. But also, because of the extreme fineness of the retinal spatial sensibility, we are aided to much more acute and minute spatial perceptions than we would ever be capable of by touch alone.

the retinal images are inverted; (3) it perceives things as single (as they are to touch) from double images, and things as the same from distorted images; (4) it perceives an approaching object as one and constant, although the retinal image is continually increasing in size; and near and remote objects, for example, a line of receding columns, as the same in size (as they are to touch and also as they appear when viewed successively from like proximity), although the retinal images are considerably different.

We began and have continued our discussion on the postulate, that spatial extension precedes and is quite independent of our cognition of it; that we do not "make space in the knowing of it," but know space already made. Many metaphysicians in our day have much to say of space as an "ideal construction." This doctrine is accepted by some as if it were a part of the larger Kantian principle, that the understanding or intellect makes nature.

If we reject every such hypothesis, we must yet assuredly admit that our *idea* of space is a construction. It is a gradual formation by association and composition of our present and remembered experiences of extension by the different senses;

resulting in our complete perception of space as a continuous, homogeneous, unitary, inert, empty room of indefinite extent. The progressive formation is properly called the synthetic functioning of the intellect. But there is no creative association or synthesis in the production of our idea of space. There is no combination of the non-spatial into the idea of the spatial. The primitive, original materials combined and synthesized are themselves extended, are our actually extended sensations. The elementary extended materials are abstracted, associated and combined by the coöperation of the senses, the tactual, motor, aural, visual, or by the analytic and synthetic operation of the intellect, into our complete idea of space. The function of the intellect is then wholly that of abstraction, association and synthesis, and not of genesis. The intellect adds nothing original to the original extended experiences or experiences of extension. It only combines them into a unitary idea of a great space. It could no more construct the idea of space out of unextended elements than a builder could construct a house out of unextended stone, brick and boards. If extension were not an original property of sensation, and therefore an original element of knowledge, there is no sufficient reason for believing that the idea

of space would ever exist. Our cognizing space, therefore, is not the constructing of an idea out of the non-spatial; but is rather a gradual fashioning of our internal complex idea, possessing original extension, into correspondence with the external reality. It is a progression to completeness of representation. Our idea of space is finished to the degree of its conformity to the real outer space.

Our full knowledge of spatial extension we have been treating somewhat as one comprehensive knowledge. It should be remarked with explicitness that our whole knowledge of extension and space is a union of two very different kinds of knowledge, namely, immediate and mediate knowledge; and one of the most important duties of the epistemology of extension and space is to note and thoroughly distinguish these divisions of the total complete knowledge.

What seems to be one of the gravest faults of modern epistemology is the failure properly to discriminate and divide the sphere of immediate knowledge from the sphere of mediate knowledge, or what we know immediately from what we know by inference, or what is within consciousness from what is outside. The words knowledge, consciousness, experience, and other leading terms, are fre-

quently used without needful qualification in this regard. To illustrate briefly: A man's knowledge of his own experience is certainly different from his knowledge of another man's experience. The former is immediate; the latter is deductive. The difference is so important as to demand full and precise distinction; but it does not often get it.

The knowledge of spatial extension, as just observed, is part immediate, and part mediate. The former is very limited; the latter is of immense expansion. We have immediate knowledge of the extension of sensation and the sensation-volume. This immediately known extension is wholly within the bodily periphery, because sensation, consciousness, or mind, is so inclosed. Mind makes no excursions during life beyond the bodily superficies; and can have no immediate knowledge of anything beyond; yet we must not entirely ignore some singular perceptual telepathic phenomena. The immediately known extension is therefore very restricted. It does not include even the extension of the closely related nervous organs or their molecular motions, or of the end-corpuscles or the cells of the dermis and epidermis. The child and the illiterate person long have clear knowledge of sensations, without

the faintest knowledge or conception of the related extended nervous elements and their vibrations. As respects consciousness or immediate knowledge, the psychical and physical are separated by a marked partition.

But our directly known spatial extension, though so narrow, is yet of the greatest importance. It is the brilliant nucleus of all perceivable outer extension and space. It is known with perfect certainty; for in it knowledge and reality are identical or indivisible, consciousness itself is extended; and on that account it is the secure and indispensable basis for all our knowledge of wider extension, which is acquired mediately or inferentially through it. Our knowledge of the external is a leap of inference from this original and sure ground. On this certain foundation we build safely an immense superstructure of inferential and representative knowledge. It is then as much as said here, that we know external space without being really conscious of it. In truth, all we are conscious of, strictly speaking, is the internal complex picture, the pure mental inference and representation. Nevertheless, our extensive representative knowledge of the external is a genuine and trustworthy knowledge, because of the nature

and certainty of its foundation; and, for the same reason, our immediate and mediate knowledges combine into one true knowledge.

There is a characteristic of our knowledge of space which we had occasion to consider in the preceding chapter and which here requires attention again, namely, its necessity. We can not think of an end to space; we are compelled to think of every perceived space as having space beyond. As was remarked, and as is well known, many have held that this peculiar property proves that our knowledge of space is *a priori* or entirely "nativistic." Some have imputed it to invariable association of ideas. We have here to answer the important question, how this undeniable necessity arises, or is consistent, with such a process of pure empirical cognition of space as that described above.

We must hold that the first experiences of spatial extension are obscure, hazy, lacking certainly in distinctness and precision as to outlines, contour, periphery, bounding surface; and at first there is not a felt tendency or necessity to think of every space as having space outside of it. Younger children do not experience such an impulse. Distinct and definite thought of limits, bounds, surface, is a growth out of the primitive vague consciousness

and perceptions of extensions; and the tendency to think of space as external to the confines of any perceived space has a corresponding growth, and only comes to full force with the development especially of the thought of bounds or contour to clearness and distinctness.

This development goes on and completes itself simply by the repetition, multiplication and comparison of experiences of extension and space; by the successive perceptions of wider and wider space. By repetitions and successively wider perceptions, thought becomes fixed more on the different contours and receding bounds, and these become more and more distinct. And the tendency to think of space yet exterior to every perceived space has a corresponding development in strength; and becomes at length irresistible. The force of the tendency is in the distinctly perceived contours, or bounding surfaces, so to speak. These looking outwards of themselves call for, demand, really assume, outlying and surrounding space. There appears, then, no need of resorting to an *a priori* law or necessity, or to invariable association. The necessity is in the perceived contour or boundary, the outward-facing surface or convex periphery, which of itself demands outer space as a counterpart, which forces

thought beyond itself to contiguous ulterior space that was not before known. There must be some length of experience of objects varying in magnitude and figure and of successive advances in discovering space beyond each wider known space; and the latter experience is no doubt invariable; but it need not be very long to produce the strong tendency in thought to pass beyond every perceivable sphere, even the greatest imaginable or thinkable sphere or horizon, of space. To know the bounds of any extension is already to have passed those bounds, to have passed them by the compulsion that is in the bounds themselves.

Before closing this chapter we wish to notice a principle respecting the cognition of space advocated by some metaphysicians of the sect called pragmatists. These maintain the doctrine that the intellect makes space; but go a step beyond it towards the purest idealism or subjectivism. They say, in substance, not only that the intellect makes space, but also that it makes it from its own purpose or for its own chosen utilitarian end. The intellect does not act from mere spontaneity, or because of external excitation and direction; but from its own internal original antecedent purpose or aim. The intellect is in this manner active, but in no degree passive. For example, it is said space is made to facilitate a

man's intercourse with his fellow beings. It is held that space is a human conception relative to human faculties and purposes, and not "valid beyond them"; and that it is right to speak of space as an independent form of reality "for every-day practical purposes." Space is thus conceived as more thoroughly, or as entirely, an internal and purposed production.

The pragmatist doctrine bewilders us by its strange contradiction of most of our experience of extension and space. Nothing can be less purposive than our earlier and chief perceptions of space. We have no consciousness of making space, and more certainly no consciousness of making it with or for a purpose. Instead of making space for a purpose, we unquestionably make our purposes with the conviction generally that they must be conditioned upon, or conformed to, space as a reality already existing, and existing without the slightest productive and purposive effort of ours. Therefore, instead of our wants or purposes determining space, space determines our purposes. The pragmatists reverse the true order of facts.

Yet it can not be denied that some of our spatial conceptions may be called "ideal constructions" for "practical purposes." This is true of geometrical quantities. For example, the geometrical straight

line may be said to be an "ideal construction," or to be made by the intellect; and to be made because of the great practical uses of such a line in the mathematical work of science. The line of our ordinary unpurposive perception is of three dimensions—length, breadth and thickness—and more or less crooked. Induced by the apparent advantages and necessities of science, or by the interests of life, the intellect constructs from this real line the ideal geometrical line. It abstracts the length from the breadth and depth of the perceived real line, and straightens it perfectly. But we must not fail to mark precisely to what extent, or in what respect, the geometrical line is an "ideal construction." It is certainly not so as being constructed from the non-spatial, from non-extended and purely successive elements or material. It is a construction just this far, that it is the result of abstracting from and correcting the ordinary line of experience. The intellect does not make the extension or length of the line, but derives the length entirely from the lengths of the real lines of experience. If it were not for the latter lines furnishing the necessary material, and the occasion, the intellect would never form and employ the straight line of geometry.

CHAPTER III.

(Supplementary to Chapter II.)

LOCALIZATION OF THE TACTUAL SENSATIONS.

The tactual sensations always seem to have place in the skin or periphery, and are not consciously localized in any other part of the body. This experience, which appears very simple and direct to the ordinary consciousness, has, however, been the subject of much philosophizing and of very diverse theories. Most psychologists hold that, while the tactual sensations certainly appear clearly to have place in the skin, they are not really there, but only in the brain; and that their appearance in the skin is an illusory projection or extradition from the nerve centers of the brain. Professor Huxley represents the most widely accepted view. Speaking of the pain caused by pricking a finger with a pin, he says: "I am just as certain that the pain is in my finger, as I am that I have it at all. Nor will any effort of the imagination enable me to believe that the pain is not in my finger. And yet nothing is more certain than that it is not, and can not be, in the spot in which I feel it, nor within a couple of

feet of that spot." "It is perfectly obvious, therefore, that the localization of the pain at the surface of the body is an act of the mind. It is an *extradition* of that consciousness, which has its seat in the brain, to a definite point of the body." "The brain is the sole seat of consciousness." *

There are various views of the cause or process of this extradition. Some impute it to an inborn law of mind, "which leads us to localize the affection at the spot where the nerve in its healthy and proper action terminates." Some make it the result of experience, in which is grounded the law, "that a sensation appears to us to be situated at the spot in which we are accustomed to meet with its usual cause or condition." †

Contrary to the above doctrine of tactual projection, a less numerous class of psychologists have held that tactual sensation is felt at the periphery because it really exists there; that it is not a projection from the brain, where only, as others say, sensation can take place, but has an original position in the skin. They maintain that consciousness, or the function of tactile sensibility, is seated not in the

* Essay, *Bishop Berkeley on the Metaphysics of Sensation*, in the vol. on Hume, pp. 256, 257.

† Taine, *On Intelligence* (Haye tr.), p. 314.

brain only, but also at the periphery, and that sensations are felt in the periphery because they may be thus actually there.

It must be admitted by all that very plausible arguments may be employed in support of the more popular and prevalent doctrine of "extradition"; nevertheless, the attentive consideration of these arguments discovers that they are not entirely conclusive, that they have been too readily accepted as final, that they do not by any means successfully and easily shut out the doctrine, that tactual sensation not only appears as if at the superficies, but really occurs there. Let us briefly consider some of the chief facts and arguments brought forward in support of the theory of "extradition."

As proof that consciousness or tactile sensibility is really seated solely at some point or points in the brain, the fact is adduced that, when a sensory nerve is cut through, sensation ceases in that part of the surface to which the nerve ran. "The skin of the finger," says Professor Huxley, "is connected by a bundle of fine nervous fibres, which run up the whole length of the arm, to the spinal marrow, which sets them in communication with the brain, and we know that the feeling of pain caused by the prick of a pin is dependent on the integrity of those

fibres. After they have been cut through close to the spinal cord, no pain will be felt, whatever injury is done to the finger." * Lotze draws the same general conclusion from the same fact: "The smallest interruption in the continuity of a nerve, even in the closest proximity to the brain, abolishes the reciprocal action of the soul with that region of the body over which the same nerve is expanded." † It is inferred from this case that sensation is really in the brain because that when the excitation coming in from the surface of the body, through the nerve, is interrupted no sensation occurs. It is supposed that if sensation were really at the surface as it seems to be, it should still be felt there after the nerve was cut through.

That the integrity of the nerves is necessary, as these writers contend, to surface sensations, can not be doubted; but yet this fact does not warrant the conclusion that sensations are really in the brain alone, and not also at the periphery. Absence of sensation after section of a nerve, does not prove absence of sensation before section. Because of the close relation, which all will admit, between the nervous organ and the agent or function of sensi-

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* *Op. cit.*, p. 256.

† *Outlines of Psychology* (Ladd), p. 107.

bility, so serious an injury to the organ as section, may be reasonably supposed to be a sufficient cause to put an end to the surface-sensations. The cut-off part of a nerve is like a limb broken from a tree. The limb withers, dies; though the tree lives. The outer portion of the nerve, having lost vital connection with the nervous organism, has lost its fitness to serve as the needed physical occasion and basis of sensation. If cessation of sensibility after section of a nerve prove that the outer end and distribution of the nerve was never a seat of sensation, then it can be proved by a like argument that even the brain itself is not a seat of sensation; for any portion cut away from the brain (and a very considerable portion, even a hemisphere, may be removed without causing death or destroying the mental functions) no longer shows any sign of mental life.* Furthermore, it may be held also that, be-

* This point is remarked also by Simon, *Leib und Seele bei Fechner und Lotze,* p. 46: "Ganz in derselben Weise, wie Lotze beweist, dass der Sitz der Seele nicht bis in die Nerven hineinreicht, könnte man beweisen, dass auch das Hirn nicht der Sitz der Seele sei. Der Nerv zeigt kein seelishes Leben mehr, wenn er vom Central-organ des Hirns getrennt ist,— doch man löse den wichtigsten Teil des Hirns durch einen trennenden Schnitt von der Hauptmasse des Hirns — auch in ihm wird sich keine leise Spur eines psychischen Lebens mehr entdecken lassen."

cause of the brain's position as the great center and head of the whole nervous system, its action is necessary to every tactile sensation and to every other mode of consciousness, especially to every consciousness of the mental unity. Surface-sensations may be in part conditioned on refluent currents from the center through the unbroken sensory nerves. These sensations always involve, or are accompanied by, consciousness of the mental unity. We may add that they may be in part conditioned also on the special constitution of the ends of the nerves or of the terminal corpuscles.

Certain striking instances of the projection of sensations to places or objects outside the superficies, where they assuredly can not be, are taken as conclusive proof that sensations felt in the superficies itself, as in the skin of a finger, can not be there, but are only false projections from the brain. Professor Huxley thus describes and argues from some of these often recounted phenomena: "Evidence, as strong as that in favour of the sensation being in the finger, can be brought forward in support of propositions which are manifestly absurd. For example, the hairs and nails are utterly devoid or sensibility, as every one knows. Nevertheless, if the ends of the nails or hairs are touched, ever

so lightly, we feel that they are touched, and the sensation seems to be situated in the nails or hairs. Nay more, if a walking-stick, a yard long, is held firmly by the handle and the other end is touched, the tactile sensation, which is a state of our own consciousness, is unhesitatingly referred to the end of the stick; and yet no one will say that it *is* there." * A very remarkable instance of the projection of sensations to places where they can not be, is in the fact that persons who have lost limbs by amputation continue to refer sensations to them as if they were present; and this reference may go on for years and years. From these cases it is reasoned, that as the localization of sensations at places and objects external to the superficies is certainly false, so localization of sensations in the skin and organs that are sound and intact is equally false. This inference is thus explicitly drawn by Taine. Speaking especially of the reference of sensations to lost limbs, he says: "It is plain that in all these cases, the sensation of twinging, of the limb being asleep, of tingling, of pain, is not situated in the absent limb, therefore *the same* sensation is not situated in the limb, when the limb is there;

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* *Op. cit.*, p. 258.

thus in the two cases, in the normal and abnormal state, the sensation has not the situation we attribute to it; it is elsewhere; it is not the sensation, but a nervous disturbance which, in the normal state, occupies the place at which the sensation seems to be;" * and remarks in general: "The situation we attribute to our sensations is always false. * * * The localizing judgment is an illusion, since we invariably situate the sensation where it is not." † He holds, as Huxley, that "the sensation really takes place in the encephalon." ‡

Projections of tactile sensations to places and objects outside the skin, where they certainly can not occur, must be accepted as undeniable. Such facts are as well established of the tactile sense as of the auditory and the visual. But they do not justify the very significant conclusion, that the ordinary localization of sensations in the skin itself is also only phenomenal projection from the brain, the "sole" seat of sensation. We are not required to accept this conclusion, but may resist it as an unwarranted *saltus in concludendo;* and contend that these projections beyond the superficies are made from the superficies, or are possible primarily

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* *On Intelligence,* p. 305. † *Ib.,* p. 318. ‡ *Ib.,* p. 303.

because of sensation being actually resident in the superficies. We may contend that the places and objects outside the superficies would not be known, and would not be made or become points for projections, if it were not for essential help given by sensations really experienced in the superficies.

An important fact regarding the tactual projections as described in the quotations from Professor Huxley and M. Taine is, that they are all made to points and objects assumed to be already well known, or to places where "we are accustomed to meet with the usual causes or conditions" of the sensations. And it truly seems altogether unlikely that sensations would be localized at the ends of the nerveless extremities, the hairs and nails, if we were not already familiar with the place and extension of these extremities; or at the outer end of a walking-stick, if we were not acquainted with the stick, especially with its dimensions, and with the objects against which it is thrust. The projection can not be accidental, or be by the mind's own motion, unstimulated, unguided, arbitrary; it can not be the work of a pure internal law of the sense, which operates with precision as to spaces and places, unexcited, unaided by the experiential knowledge of the spaces and places. Sensations are not

projected by the pure internal force and determination of the sense or the mind to unknown external objects; but, rather, well-known external objects draw the sensations out, so to speak, to themselves.

As respects especially the reference of sensations to the places of lost limbs, there seems to be no strong reason for believing that sensations would ever be so referred, if they had not been localized in the limbs before the limbs were lost. These earlier experiences may be regarded as the necessary basis of all references to limbs after they are gone. This view presupposes a very tenacious association between sensations and their original places.

It is the significance of the external causes and conditions of the tactual sensations in our practical life which gives them the power to detach, so far as they do, the sensations from the superficies or the mind, and to attach them to themselves. But that even the most familiar and important outer objects should be able in this manner and degree to draw sensations away in appearance from their original positions or from the mind and associate them with themselves, is one of the most remarkable phenomena pertaining to external perception.

The most important problem for the school of Huxley and Taine respecting the localization of the

tactual sensations, and the most important demand to be made upon them, is, to show, if all sensations be in the brain alone, how we ever come to know anything outside the brain, as our bodily organs, and extra-corporeal places and objects to which we project sensations, or how we "meet" at the surface of the body with the usual causes of sensations. Sensations being apparently indispensable to external knowledge, it would seem that if they have place in the brain alone, they can know, or be the means of knowing, only what is in the brain; or all the known external would must be really within the brain. It is not easy to understand how our knowledge could ever go beyond the brain if there were not sensations beyond the brain. These writers, in their assumption of the extra-cranial organs, surface, objects, as if already existing and known when projections are made to them from the brain, seem to beg everything regarding external localizations.

Taine endeavors to answer the problem just spoken of. He derives his answer from the muscular-sense hypothesis of the nature and knowledge of space which he has adopted from the English psychologists, Bain, Mill and Spencer, and fully expounded. According to this hypothesis, as already in part noted, space and the objects contained in it

are muscular sensations of movement and resistance. A spatial line is a pure succession of muscular sensations. A spatial point is the termination of such a line. Space is the composition of pure temporal series of muscular sensations. Material objects are muscular sensations of resistance. Muscular sensations are not only the means of knowing extensions and space, but they are, or they constitute, extensions and space. Space is not a reality independent of our mind or sensations, but is possible and actual only in the muscular sensations. In particular, a line on the surface of the body is a pure time-series of muscular sensations; and a point on the surface is the end of such a series.

From this hypothesis it follows inevitably that the whole spatial world subsists where the muscular sensations subsist, that is, only in the brain or in the mind; and that the supposition or appearance of a world as outside the brain or mind is wholly false. The spatial world is the creation of the muscular sense; but so far as it appears external to the sense or mind it is an illusion. This conclusion Taine thus declares and accepts, in substance, for himself: "We have found that the objects we call bodies are but internal phantoms, that is to say, fragments of the Ego, detached from it in appear-

ance and opposed to it, though fundamentally they are the Ego under another aspect; that, strictly speaking, this sky, these stars, these trees, all this sensible universe which each of us perceives, is the work of each of us, or rather his emanation, or rather his creation, an involuntary creation, effected by him spontaneously without his consciousness of it, and extended to infinity around him." *

It results respecting the localization of the tactual sensations, that placing a tactual sensation at a certain point of the superficies is to have a pure succession of muscular sensations of a certain length terminated by a tactual sensation. We make and place a tactual spatial line at the superficies by incorporating a pure succession of muscular sensations with a pure temporal experience of tactual sensations. These localizations yet, it will be remembered, Taine declares are fictitious. He says: "The situation we attribute to our sensations is always false. * * * The localizing judgment is an illusion, since we invariably situate the sensation where it is not." It is evident, however, that these statements are an essential part of the more general conclusion just noticed above, regarding the illusory

* *On Intelligence*, p. 350.

character of the whole external spatial world. "We invariably situate the sensation where it is not," because we invariably situate it at a place in an extra-cranial or extra-mental world that is not outside of the mind.

We will not deride or stigmatize those psychologists who find satisfaction in the astonishing presumptions and subtilties of the muscular-sense hypothesis of the genesis and cognition of spatial extension and in the involved conclusions respecting the localization of the tactual sensations; but the hypothesis should be discarded as being entirely fanciful and spurious. Its fundamental postulate is, that space-extension is identical with, or a transformation of, time-extension. Position in space is derived from position in time. Length in space is generated from or by length of time. A more unwarrantable postulate than this can not be imagined. No real evidence is producible that spatial extension is not as original and primitive in existence as time, and our knowledge of it not as original as that of time. It ensues, in fact, from the muscular-sense hypothesis, that there is no real space, but only events of time — no spatial, but only temporal, positions, distances, extensions.

Pure temporal muscular sensations surely do not constitute spatial extension or space. There is not space because I move freely; but I move freely in space already independently existing. The most that can be claimed for the muscular sensations is what has been before admitted, namely, that they are means, but not the only means, of cognizing places, extensions and space that already exist and are entirely independent of them and of all other sensations. Space must precede movement; although movement must precede the knowledge of space. The muscular sensations of movement are especially efficient in the cognition of distant and great extensions. But yet these cognitions are not the result of the original ability of the muscular sense; but of a derived ability, as we have contended before.

The real problems regarding the localization of the tactual sensations, made more evident by the conspicuous faults and failure of the muscular-sense hypothesis, are these: How do we situate these sensations in a space and at objects already existing and quite independent of them? Are these sensations within the brain alone, or do they occur also at the external and equally real superficies? Is it

possible for the tactual sensibility, by its presence and diffusion in the superficies, to give of itself, originally, the places, reciprocal distances, and extensions of its sensations?

We have considered the objections to the real occurrence of tactual sensations in the skin, based on the stopping of sensations after section of nerves, and on projections of sensations that are known to be false—that are made to places where sensations manifestly can not be. We have found these objections to be indecisive. The argument from section of nerves evidently proves too much, and is otherwise inconclusive. The false projections of sensations to objects outside the skin are indisputable; but they by no means compel the conclusion that localization of sensations in the skin itself is false projection. These plausible objections still leave us free, as far as they go, to maintain the theory of actual occurrence of sensations in the skin, if we have any evidence of actuality or possibility.

The persistent and invincible conviction, which is recognized by all, of our really experiencing sensations in the skin can not be easily surrendered on the accusation of illusoriness. It may well induce hesitation, and suspicion of some defect in the

supposed demonstration of its falsity. Again, the assumption that the sense or the mind, considered as situate at a point in the brain, can be stimulated or can be able to "extradite" a sensation across an unmeasured, untraversed interval of space, to a remote part of the superficies, which is unknown, and which can not be known immediately, because of the space-distance between it and the seat of the mind, is incredible. Tactual sensations are falsely projected from the superficies as an original seat to well-known outer points; they are ordinarily not falsely projected from the brain to the superficies itself.

Further, we may well inquire, why should not tactual sensations take place as really at the outer end and ramifications of the nervous organ as at the inner end? The possibility of the real existence of these simple sensations in the skin is favored by some facts of comparative psychology and development. It is remarked by McKendrick and Snodgrass: There is the important question "whether physiologists are right in relegating consciousness entirely to the gray matter of the brain. The facts of comparative physiology are against a view so exclusive, because we can not deny consciousness to

many animals having rudimentary nervous systems, or none at all." * Professor Paulsen notes: "In den niedersten Formen tierischen Lebens finden wir kein Nervensystem, das seelische Leben daran zu heften. Der Körper der Protisten weist überhaupt nichts von einem Zentrum auf, in den man den Sitz des Seelenlebens lieber als an jeden andern Punkt des Systems verlegen sollte. * * * Ist der organischen Materie ursprünglich an jedem Punkt Beseeltheit eigen, so ist nicht abzusehen, wie sie dieselbe später sollte völlig eingebüsst haben: Zentralisierung des physischen Lebensprozesses auf höheren Entwickelungsstufen is mit Umbildung des Lebens der Teile begleitet, aber nicht mit Vernichtung. Sollte nicht auf psychischen Gebiet ein Ähnliches stattfinden?" † Huxley observes especially of the epidermis: "One of the most wonderful revelations of embryology is the proof of the fact that the brain itself is, at its first beginning, merely an infolding of the epidermic layer of the general integument. Hence it follows that the rods and cones of the vertebrate eye are modified epidermic

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* *Physiology of the Senses,* p. 287.

† *Einleitung in die Philosophie,* 4 Aufl., p. 144.

cells. * * * All the higher sense organs start from one foundation." *

We seem, then, to be not without justification by the present state of science in holding to the general view that, since tactual sensations are certainly localized, or certainly seem to exist, in the skin, this depends upon the real presence of simple tactual sensibility in the skin, by which presence we have immediate knowledge of the tactual positions and extensions; that the sensations are not merely phenomenal projections to these positions, like the

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* *Sensations and the Sensiferous Organs* (Vol. on Hume), p. 316.

The same fact has been remarked by others:

"The sensitive cells of the epidermis are the sources of all the different sense-organs. * * * The rod-cells in the retina of the eye, the auditory cells in the cochlea of the ear, the olfactory cells in the nose, and the taste-cells on the tongue, are all originally derived from the simple, indifferent cells of the epidermis, which cover the entire surface of the body," etc. (Haeckel, *Riddle of the Universe,* p. 293. See pp. 294-5.)

"Pflüger has attempted to demonstrate by many experiments that consciousness is not confined to the brain, but is also connected with the spinal cord. Why, however, draw a line at the spinal cord? Is not nerve substance the same with that from which the spinal cord and the brain develop, are not all nerve cells primarily mere modifications of cells of the outer skin?" (Williams, *Evolutional Ethics,* p. 317.)

projections of tactual sensations to points or objects outside the skin, but appear to be in the skin because they really are in it; that, in short, the apparent existence of sensations at the periphery can be accounted for only by their real existence there — they make their places known of themselves by their actual presence.

It appears indisputable that the visual and motor senses do not, instead of the tactual sense itself, originally furnish the places or knowledge of the places at the periphery for the localization of the tactual sensations. These senses have no such precedence and leadership over the tactual sense. Facts seemingly warrant just the opposite assumption, viz., that the tactual sense is the leader of the visual and motor in all their perceptions of depth or of distance from their original seat or from their immediate organs; that it furnishes the first basis for the knowledge by sight of the outlines of the body, and for the knowledge by the motor sense of places where tactual sensations are excited by the extremity of a moving limb. Knowledge of the place of the tactual sensations by the eye and by the end of a finger moved with the arm is only a mediate perception, being acquired by association with the tactile sense to which the knowledge is

immediate. In other words, the visual and motor sensations are only signs of these places, which recall by association the original knowledge of the places by the tactile sense. Moreover, it is probable that projections of tactual sensations to objects outside the superficies are made from the immediately known and localized sensations in the superficies; and if it were not for the latter there would be no such projections. We come to a knowledge of objects external to the superficies by the necessary aid given us by sensations actually occurring in it and excited by them.

But it must be granted that, though the knowledge by the tactile sense of positions in the superficies is immediate, still some time is needed to acquire it. The first impressions on the day of birth are not truly and clearly localized. The infant apparently does not for a considerable time situate sensations in the toes or the legs precisely. Consciousness goes through a development in the cognition of the dermal places. Time is required for consciousness to rise to the mastery of plurality of sensations, or to come to considerable exercise of the power of memory, comparison and unification. Though endowed with the innate capability of immediately knowing the place of sensations in the

superficies, the mind seems to be at first sunk in profound dormancy and to require many excitations to awaken it and bring it fully to itself.

Finally, we briefly remark something further respecting the projection of sensations to the places of absent limbs, which has been by so many regarded as conclusive proof against the actual presence of tactual sensations in the superficies, or proof that the apparent presence is but illusory projection from the brain. It is very probable that, as already observed, sensations would not be projected to a lost member, if sensations had not been frequently experienced in the member before it was lost. The projections seem to be the result of familiarity in the past with sensations in the member, or of association of sensations with it made strong by frequent repetition.

This association is, for many causes, long preserved in vivid memory. So constant and so important is the use and advantage of the arms and legs that the loss of one of them is a misfortune which will not allow itself to be forgotten, but will always keep itself fresh in mind. The embarrassment of the present will continually recall the facility and experiences of the past. The unfortunate person will be reminded of his lost organ also by the cease-

less comparison he is forced to make between his disadvantage and the advantage of those who have not suffered the like loss. Doubtless reference of sensations to an absent, and also to a congenitally imperfect, limb is in cases explicable at least in part by the sense-experiences in the corresponding limb on the other side of the body which remains or is perfect.

CHAPTER IV.

NATURE AND COGNITION OF TIME.

I. Reality and Nature of Time.

The question, What is Time? has a similar diversity of mode and answer to that of the corresponding question regarding Space. Is Time a distinct entity, or is it a property or relation of entities? Has it subjective or objective existence, or both? Is it real, or only phenomenal? It has long been the view of many, we may say the generality of men, that time is a distinct or independent reality, in which events or changes occur, as it is held that space is a reality in which things have place; that there is a time-room which contains events and successions, as there is a space-room which contains objects. Many arguments against the reality of time are directed against time as so understood. Numerous others, following the lead of Kant, have held that time is only a form of our sensibility, a mode of our perception; is not a real property of the mind, or of anything in the mind, or of any object outside the mind, but is only a form

in which the timeless mind casts its perceptions. According to this view, time is only ideal, or has reality only as an appearance; it has no existence as an entity or as an actual property of the mind or of any other reality. It is not our purpose to enter upon a particular discussion of these or other historical theories of the nature of time; but shall proceed at once to a statement of what we suppose to be time's real character.

Time is not a distinct or independent reality, but is a property or attribute of realities — of the mind, of objects in the mind, and objects outside the mind. It is simply the permanence, duration, continuance, of things. Time is not only an apparent, but an actual, attribute. It has genuine reality; not indeed as an entity or substance, but as an attribute. And we may add, with special regard to the relation of time to the mind, that it is not a product or creation of our mind or thought, but its property. Time exists thus with realities, and as long as realities. If space and its contents, or all realities, were annihilated, time as their attribute would be annihilated with them. It would not remain as an empty and independent entity after they were gone.

"Duration," it has been said, "can only mean continuous existence through time, and without the

notion of time duration loses all significance." * We should rather assert that duration is time; there is no time, and no need of time, independent of the duration of things. Banish all enduring realities, including space, and time goes with them. A thing may indeed endure, or seem to endure, through time; yet not time as an absolute or independent reality, but the time of other things contemporaneous or older. The only independent time is the time of other things or of the environment. Therefore in our measurements of time we generally estimate the time of one thing in the time of another — of the transient in the time of the permanent, of the small in the time of the great. Successions we measure by means of longer and more important successions.

Everything has its duration or time; but there are yet not different times or times independent of one another. There is, in fact, but one time, namely, the time of the world, or the general system of things, or the universe. The duration of everything is of the duration of the universe, and for the reason that everything is an undetachable element, part or member of the universe. Further, the one

* Bowne, *Metaphysics,* Second ed., p. 179.

time has absolute length, and the times of all objects have the same absoluteness of length. It is true that in our direct estimates of time, *i. e.,* in our estimates by our thought without the use of a chronometer, we vary in our measurements of the same real length; a pleasant time is judged to be shorter than a painful time of the same identical length; our judgment is warped by our feelings and passions, and by other means. Still duration is everywhere of the same absoluteness of length; though our thought varies in its estimates, time itself does not vary; an hour which seems to be long is really not a moment longer than an hour which seems to be short. It is an old saying, that "time flows equally"; and it is true with the meaning that time is "uniformly successive in its parts and homogeneous throughout its entire length."

Succession or change and simultaneity are often treated as modes of time or as distinctions within time. They are of the elementary and most certain distinctions of our experience. It may be casually remarked of permanence that it unites in itself duration and identity. Succession may be described as broken duration, or as duration divided into portions, but portions which are never really or conceivably separable. A succession may consist of

terms that are qualitatively the same, or of terms that are qualitatively different. By change we probably mean or imply generally a succession of qualitatively different terms. Simultaneity is of permanent and identical objects, and of events, that are together; it is also of different successions that do not follow one another, but run side by side. Simultaneous objects or events are together, in many cases with one other object or event that is conspicuous; and simultaneous successions are together, often with one other succession that has superior importance.

From the definition of time and these general statements of facts, we proceed to consider some of the arguments that are employed against the reality of time, as they may seem pertinent especially to time as just defined and described. Objections, similar to those made against the reality of space, are made against the reality of time. Among the most notable of these are the objections grounded upon the contradictory impossibilities of our thought respecting the whole extent and the divisibility of time. It is said, rightly as all must admit, that we can imagine neither an absolute beginning nor an absolute ending of time, and neither an infinite recession nor an infinite progression of time; and,

further, as respects divisibility, that we can imagine neither an absolute limit to the division of time nor its infinite division. In the words of Sir W. Hamilton: "Time is positively inconceivable, if we attempt to construe it in thought;—either, on the one hand, as absolutely commencing or absolutely terminating, or on the other, as infinite or eternal, whether *ab ante* or *a post;* and it is no less inconceivable, if we attempt to fix an absolute minimum or to follow out an infinite division." *

Then, first as regards the opposing impossibilities of thought as to the total extent of time, it is argued, as we have seen it to be argued by metaphysicians respecting space, that since we can not conceive time as having no time before it and none after it, nor as infinitely receding and proceeding, therefore time is incomprehensible, it is self-contradictory and illusory or a fictitious appearance. Our apparent knowledge of time is no true knowledge, but only ignorance; our thought is shut in between alternative impossibilities, it is self-contradictory and can not be true to reality.

It seems hardly necessary to dwell on the inconclusiveness of this reasoning, and to show that it is

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* *Discussions,* p. 571.

as worthless in respect to time as the similar reasoning in respect to space. We certainly do not know the whole extent of time; we can not conceive how far it runs backward or how far it will run forward; we can not tell when things began, or whether and where they will cease; but, none the less, we know or definitely think of great stretches of time, as the long time of history and the much longer time of geology. Why, notwithstanding our inability to know or to think of time in its total length, or of the world in its total duration, should not this very long finite and relative, but definitely thinkable, time be real and our thought of it be true? Why must we know the whole of time to know any of it; or why should it be said, "until we have reached a whole we have reached nothing"? Again, what possible genuine basis can there be for the assertion, made by some metaphysicians, that time perishes in an endless process beyond itself?

There seems to be no real basis for treating the limited and related times, long and short, which we know as self-contradictory and unreal, and our thought of them as ignorance or a false light. We know with much certainty the duration of the Roman Empire from 753 B. C. to 476 and 1453 A. C. We have probable knowledge of historical

time that runs back of the founding of Rome four or five thousand years. Then we come to dark ages. How far these run back, whether to an infinite distance or only to a remote point, we do not know and can not conceive. But our inability, however long we may make the effort, to think of the regress and also the progress of time as either infinite or absolutely finite, does not afford a shadow of ground for the conclusion that "time perishes in an endless process beyond itself" or by transition to an "illusory perfection." The relative historical time which we cognize, and which we divide by exact dates into portions short and long, does not perish; it abides, we may say, by memory and by records; besides, it should be noted that though the motions and changes of things pass and end, the things themselves do not end, but endure and preserve the reality of time. The unknown part of time can not make the known unreal or illusory; the far unknown does not make unreal the near known. The comprehensible finite and definite time, we should insist, certainly is not found to be nothing or a fiction in the forever unsuccessful endeavor to conceive either how much time preceded or how much will follow it. Further, it is in no wise ever inconsistent or contradictory with itself, and never

suffers anything like the disappearance, dissolution, annihilation, which some imagine and contend for. The case in brief is this: We know a part, a large part, of the homogeneous whole, but not all, because of the limitations of our intellect; and there is no ground for denying the reality of the known part. We can comprehend a genuine part of duration within outer parts before and after of inconceivable extent. It may be said likewise of our thought of finite and relative time, that though it is shut in, in both directions, by impossibilities of conception, and is thus "conditioned," it is not self-contradictory and untrue. Our thought is weak, it can not grasp all time; but it is neither deceiving nor deceived. It can not be declared to be untrue to the long historical, and very much longer geological and astronomical, times which it is able to comprehend. The strongest argument against the self-consistency and reality of the finite and relative time which we seem to know, and against the truthfulness of our conditioned knowledge, is the obstinate and unjustifiable prejudice of metaphysicians.

Again, the reality of time, as that of space, is denied on considerations respecting divisibility. As to time, it will be admitted by all we can not conceive its divisibility either as having an end or as

being endless, either as having an absolute limit or as being unlimited, infinite. Many, then, have argued that though neither of these contradictory alternatives is conceivable, yet one of them must be true. In this dilemma, the greater number apparently have decided in favor of the second alternative, that is, the possibility of the endless division of time; or they have held that the division of time may be possibly carried down to parts that are timeless, durationless. In this ultimate division, the relations between parts come to be empty relations, that is, relations without parts, or relations of nothings. The conclusion is then drawn that time must be composed of ultimate parts or units that are timeless or non-existing, and therefore that time is not time, that it can not be real, but is only an illusion, as real time can not be composed of timeless elements. It is further said that as every portion of time is divisible—divisible into before and after—it can not be a genuine unit. Time passes away by internal division, or it is the "false appearance of a timeless reality."

Mr. Bradley remarks: "If you take time as a relation between units without duration, then the whole time has no duration, and is not time at all. But, if you give duration to the whole time, then

at once the units themselves are found to possess it; and they thus cease to be units. Time, in fact, is 'before' and 'after' in one; and without this diversity it is not time. But these differences can not be asserted of the unity; and, on the other hand and failing that, time is helplessly dissolved. Hence they are asserted under a relation. 'Before in relation to after' is the character of time. * * * The relation is not an unity, and yet the terms are non-entities if left apart." * He says again: "No duration is single. The would-be unit falls asunder into endless plurality, in which it disappears. The pieces of duration, each containing a before and an after, are divided against themselves, and become mere relations of the illusory." † And again: "Time must be made, and yet can not be made, of pieces." ‡ He arrives at the general conclusion: "Time, like space, has most evidently proved not to be real, but to be a contradictory appearance." §

The oracular reasoning of Mr. Bradley is singularly capricious and illogical. His central error consists in the assumption that, as time is divided by a sort of ideality or by words, it is divisible actually.

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* *Appearance and Reality*, p. 39. † *Ib.*, p. 46.

‡ *Ib.*, p. 61. § *Ib.*, p. 43.

He treats the actual division of time as if it were the easiest and most familiar process known. But a more arbitrary and unjustifiable assumption can not well be made. An ideal, though not an imaginable, division of time is certainly possible; we may talk and reason about division with perfect ease and clearness of understanding; but the actual division of time into parts of any perceivable or imaginable length, and more certainly into parts having no length at all, is altogether unimaginable and impossible. We are expected unhesitatingly to admit as always possible and actual a division which, as far as our knowledge goes, and as far as we have any reason to believe, never has taken place and never can take place. The time Mr. Bradley himself starts with is forever indivisible. It is undivided at the beginning, and actual division is not known to be possible ever afterwards.

We divide or mark a yard-stick into inches, without chopping it into inches; and, though the stick is so marked, as by a series of stamped characters running from one end to the other, it perfectly preserves its integrity. So we divide a day into hours, without sundering it into hour-pieces, and without being by any means able to do so; the day thus divided into hours still preserves, as a day, its

unity absolutely. If time were actually divisible into ultimate parts that are timeless, then it would possibly be liable to all this sad fortune of self-destruction, dissolution, disappearance; but since actual division into parts of any length, or no length, is unimaginable and never known to be actual or possible, the postulate of dissolution and disappearance is a voluble delusion.

The continuity and discreteness of time have been thus compared: "Time is both continuous and discrete, continuous as quantity, discrete as a measurable quantity divided into intervals of days, months, years, etc. These intervals designate and measure temporal duration. Duration, thus considered, consists in immanent measures and divisions of time. But since time is continuous as well as discrete, all time-intervals may be regarded as parts of one infinite whole of duration." * Still it should always be distinctly observed, that though the continuity and discreteness of time are thus distinguishable, yet discreteness is never actually separated from continuity, but always united with it. Hours and days are never actually separated from one another, but are absolutely continuous. There is

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* *Philosophical Dictionary* (Baldwin), II. p. 698 a.

never any real break in time. Continuity is real, but discreteness is only ideal—the ideal divisibility of really indivisible continuity.

Since real division of time is not known to be possible, there is no ground for asserting that time is made of pieces or parts, or is a composite. Metaphysicians have erred in the same grave way in respect to time, as they have in respect to space, by treating it as if, like a bit of matter, it were a composition, and were, therefore, divisible into separate parts. Actual division of matter into separable parts and recomposition are among the most familiar facts; but anything of like character pertaining to time has never been known, and can not be maintained, by any one.

As time or any arbitrary portion of it, a day, an hour, a minute, is indivisible, and division, so far as we know, never has been and never will be possible or actual, we are compelled to refuse the particular conclusions of Mr. Bradley regarding the unity and simplicity of time, and to adopt the contrary. "Time in fact," he says, "is 'before' and 'after' in one, and without this diversity it is not time. But these differences can not be asserted of the unity; and, on the other hand and failing that, time is helplessly dissolved." The fact is, every

duration, long or short, is a true unit. As a unit it embraces indeed the peculiar duality of before and after, or of the past and the present. It embraces them, but yet is neither compounded of them nor resolvable into them as separable elements. Before and after exist only as they exist together or in unbroken continuity. Each is necessary to the other. Without the other either would not be. Co-existing in such necessary association, they form a true and indissoluble unit. The assertion that "the would-be unit falls asunder into endless plurality, in which it disappears," is wholly unwarranted and arbitrary. Every portion of duration, though embracing distinguishable parts, appears to be absolutely solid and unbreakable, an indestructible unit; there is never disappearance by falling asunder or dissolution. The unit never shows any disposition or ability to fall asunder, but conserves its integrity as if by an irresistible and unchangeable determination. As we have contended that the finite and relative time we know does not perish by endless process outside itself, we now contend that it does not perish by process of division and dissolution inside, nor by the outside and inside processes combined. In fine, duration is a unique, perfect, and apparently eternal unitary property inclosing distin-

guishable parts. Holding thus before and after, or past and present, in indissoluble unity, is the most peculiar characteristic, and, we may add, the mystery, of time. Time, then, possesses a unity of its own kind, as does space; it includes in indivisible oneness both before and after, as space includes both here and there; and time's species of unity, equally with that of space, must be regarded by metaphysicians as primordial, and, so far as can be known, imperishable. It may be remarked that in their theories of the nature of both space and time, many metaphysicians have been too much influenced by the Kantian phenomenology, which in both its matter and vocabulary has outlived its usefulness and continues a presumptuous hindrance to the progress of a better ontology and epistemology. The arguments against the reality of time, based on the contradictory impossibilities, or the antinomies, respecting both the total extent and the divisibility of time, or our thought of them, seem to constitute only a complex delusion.

An argument of this sort has been made against the reality, and for the ideality, of time: The past is gone, the future is not yet, the present is but the infinitesimal instant that divides the past and future, or rather is not time at all; therefore, it is

concluded, time can not really exist. Those who reason in this manner generally fail duly to recognize and appreciate the very important and decisive fact, namely, that though the past is not now, still it has been, and has left memories of itself. Because it has been, and has left permanent foundations of memories of itself which include one of the profoundest and most dominating convictions of our soul, that is, the present belief of the reality of the past, the past has an ontological superiority, so to speak, over the future, and must not be placed on a level with it. The future is not now and never has been. In never having been it is inferior to the past, which though not now existing, yet has had existence and has left present effects and permanent realities. We indeed expect the future, as we remember the past; but it must be admitted that, in relation to reality, expectation is inferior to memory. We are less certain of the future than of the past. Therefore while we must grant the unreality of the future, since it is not yet and has never been, we must not grant likewise the unreality of past time. The past is certainly gone, but it has left abiding vestiges and realities which are endowed with unique capabilities of reproduction and creation of belief. If we may not be able to conclude

to the reality of time from the relation of the present to the future, yet we are able so to conclude from the relation of the present to the past.

We have been arguing that time is a real and universal property of things—that it has genuine, full and permanent reality and belongs to every existing object; and have been resisting certain objections. But many metaphysicians contend further for contrary views. They hold that time is not ultimately real or valid; that it is a transient phase of things, a "superficial terrestrial adherence to thought," and is to be superseded or transcended; that presentation in time is a lower form of thought, "deficient and inadequate to the truth"; that time is "for" the mind, but is no real attribute of it. There is discoverable sometimes among metaphysicians an incomprehensible ardor to degrade time and to get rid of it. As obstinately opposing these views appear the everlasting presence of time and its very great prominence and function in all our life. But we shall not proceed in extended counter-argument; for the main design of this discussion is not criticism and demolition, but construction; we must be content for the most part with the statement and elucidation of a positive doctrine. Some of these negative conclusions seem to be the result

of a disposition in metaphysicians to take nature, not as it is, but as they think it ought to be.

Opposing the universality of time, some contend for the existence of timeless realities, as a timeless mind or subject. They very emphatically deny time to God, and assert that, for him, there is only a *totum simul,* or all events are "present at once." But no certain evidence has ever been produced of one timeless reality in the universe. Time persistently appears to be in and of everything, it invincibly holds its place against timelessness everywhere. There are no conclusive reasons for treating time as a mere form, and not an attribute, of thought; or as a passing phase of things; or as a characteristic of the lower levels of thought and existence, which is transcended upon the higher. It does not appear to be a degradation or misrepresentation of God to impute to him time as an attribute. It can not be maintained that time is an entity in any wise independent of God; but why may it not belong to him, or be for him, as an attribute? Why may there not be real succession, or real past and present, in his activity? Why may he not produce, from a primitive design, an evolution of being that is actually temporal, and himself not have like duration with

his production? It seems certain we should not easily accept any doctrine similar to that of the notorious Hegelian proposition, that the "true knowledge of God begins when we know that things as they immediately are [including their temporality] have no truth." What we assume and affirm of the divine being must not be inconsistent and irreconcilable with our near and confirmed knowledge of human attributes and conditions. Our ignorance of, and inability to conceive, the whole duration of God, or his remote past and remote future, proves nothing against the consistent reality of his duration, and against that portion of it which we may know. Most assuredly there is no divisibility that would dissolve or disintegrate a temporal subject to nothingness. We should, however, suppose that God differs from man in possessing a memory and expectation that are in every way complete and perfect — an absolutely perfect retention of the past, and a like vision of the future.

Finally, we will here speak briefly of a subject which we shall probably have occasion to consider more fully hereafter, namely, the pragmatic doctrine that our idea, experience, even the reality, of time is caused by our cravings, longings, dissatis-

factions, social relations.* This theory makes more particular reference to future time than to past; these emotions being especially represented as producing the future in order to provide for their own fulfillment. But this procedure does not seem to accord with the real order of our experience. Our knowledge of the past is earlier and more important than our knowledge of the future. In our cognitions of time, at least our earlier cognitions, the

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*"A mere series of 'nows' would give us no knowledge of time. * * * It is the impulses and interests that the present does not satisfy that bring the fact of time before us; it is appetition that leads us to await; and the tension of pursuit gradually nearing its prize that marks the succession and measures the length of time." (Ward, *Naturalism and Agnosticism,* II. p. 146.)

"Dissatisfaction, unfulfilled craving, and the time-experience seem to be bound up together, and time to be merely the abstract expression of the yearning of the finite individual for a systematic realisation of its own purpose which lies forever beyond its reach as finite. * * * The finite, just because its very nature as finite is to aspire to a perfection which is out of reach, must have its experience marked with the distinction of *now* from *by and by,* of desire from performance." (Taylor, *Metaphysics,* pp. 262-3.)

"Our experience of time is for us essentially an experience of longing, of pursuit, of restlessness." (Royce, *The World and the Individual,* II. p. 125.) "In pursuing its goals, the Self lives in time." (*Ib.,* p. 134.)

relation of the *now* to the past is more for us than the relation of the *now* to the future. Again, it seems to be a mistake, in explaining the rise of the thought of time, to give such exclusive attention and precedence to these emotional experiences. No doubt, we have the knowledge of time with our craving, appetition, pursuit; but hardly more really than with other successive experiences of whatever kind. Every succession of mental affections is accompanied by the sense of time. The soul does indeed live in time "in pursuing its goals"; but it just as really lives in time when it has successive experiences that involve no pursuit of anything, that have no goal in sight; as in a series of sensations occasioned unexpectedly by an independent outer object or another person. The emotions that look towards the future have much influence in determining the vividness of our thought of the future, our interest in it, the care and accuracy of our estimates; but they are no more essential to the sense of the future than series of affections that look chiefly towards the past or than any other class of mental affections. The thought of the future in the original and earlier instances is an absolutely spontaneous act of mind, independent of purpose, wish or volition. Actual succession of any kind of expe-

riences will occasion it. The essential condition is past succession, not the special character of the terms of the succession. Further, our desires, cravings, aspirations, imply an already existing time; for they are the result of development, they rise gradually to strength and domination through temporal conditions. Therefore it rather seems that they are made by time, than that time is made by them. They do not of themselves create or provide time for their own fulfillment, but find time prepared altogether independently of themselves as the condition of their fulfillment. The pragmatic hypothesis, though apparently gratuitous and baseless, is yet not without interest as a psychological novelty.

II. OUR COGNITION OF TIME.

The question of the reality of time, as of the reality of everything else, stands in the closest association with the question of knowledge. Time, like all qualities and realities, is real for us only as it is known by us. Our knowing certainly does not produce or create time; rather, the reality of time is the fundamental condition of our thought or knowledge of it; nevertheless, time has reality for us only as it is known. We can affirm reality only upon

knowledge. There is no problem as to the cognition of empty time, or of independent and abstract time; for there is no such time. The only time is the duration of things, the property, *i. e.*, the continuance, the endurance, of things. If enduring realities did not exist, there would be no time; if they were extinguished, time would perish with them. Therefore it is properly said, that we have no knowledge of time that is not the time of something, there being no time independent of or apart from realities.

It has been maintained above that time or duration is the property of all things,—of space and all it contains, as mind and matter; but also that there is a unity in all durations, because all things are closely linked together as members of one general enduring system, or all parts have the time of the whole. There is a corresponding unity in our thought of times. We know the one duration because we know things in their relations with one another and as constituents of one world.

The first and most directly known time is that of our own mind, self, or experience. It is so because our own self or successive experience is nearer, is more intimate, to us than is anything else,—in a sense that will become clearer as we pro-

ceed. This is substantially the doctrine of Locke. He says: "That we have our notion of succession and duration from this original, viz., from reflection on the train of ideas which we find to appear one after another in our own minds, seems plain to me." * Further, not only is the time of self the first known to us, but the time of everything distinct from and outside of self is known through it. In other words, we know the time of any external reality or event, by means of our knowledge of the duration of the effects which it produces on us or on the train of our experience. Knowledge of the changes and time of our experience is the necessary medium of the knowledge of the time of everything else; just as our experience, our sensations and other modes of consciousness, are the medium of our knowledge of every other property of outer things. Moreover, we come readily to know objective times that are vastly longer than our personal duration, by ideal elongation, repetition, multiplication, synthesis, of the times of our personal experiences. Thus, in general, the knowledge of the time of self, or of the stream of experience, is first and direct; that of all external reality is indirect,

* *Essay*, II. xiv. 4.

through the time of our experiences as the indispensable medium.

Then, the first and chief problem for us concerning the cognition of time is, How does the mind know its own duration? or, How do we become cognizant of the time of our successive ideas or the stream of consciousness? This is one of the great problems of epistemological science, and many answers have been offered. We are compelled to admit that the problem is not an easy one, and even that a complete answer is impossible. We can proceed a certain distance towards a solution, but then we encounter barriers that seem to be forever impassable.

The main difficulty in solving this problem is in the fact that we can have immediate or direct knowledge only of the present; or in the fact as stated by Professor James, that "the feeling of past time is a present feeling." * The mind does not exist at or in the past or in the future; for the past is gone, and the future is not yet; it can then directly know only the point of time where it is, that is, the present; it can not directly know the past or the future. Thereupon the hard question

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* *Psychology*, I. 627.

arises, How come we to know time that is not present? and of what sort is our knowledge of it, since it is not direct? How does the present thought know the past, or how come to have in itself the conviction of the past, or the conviction that it represents the past? or, How come the present and past to be combined in a momentary and unitary knowledge? In struggling with this great problem, we shall consider chiefly the question of our cognition of the past, or of the relation of the present to the past, and not the question of our cognition of the future, or of the relation of the present to the future; because the former knowledge comes first in actual occurrence and is the more assured and important.

The mind becomes cognizant of its past, or of its present and past in their actual unity and indivisibility, or it combines its present and past in a unitary and indivisible knowledge at the present moment, because it embraces within itself both the facts of succession and permanence. These facts of succession and permanence are the primary provisions for the mind's unitary cognition of its own time, or of its present and past.

Every one is perfectly familiar with the constant succession of ideas or thoughts. Within this suc-

cession is always involved the knowledge of time. To be cognizant of succession is to be cognizant of time; for succession is but a, so to speak, broken or partitioned duration. But though the knowledge of time is always involved in the succession of thoughts, it is not because of the succession taken by itself or abstractly. This conclusion is generally maintained by psychologists. Many of them unite in the assertion, that a succession of ideas is not the idea of succession. Says Professor James: "A succession of feelings, in and of itself, is not a feeling of succession. And since, to our successive feelings a feeling of their own succession is added, that must be treated as an additional fact requiring its own special elucidation." * It must be acknowl-

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* *Psychology,* I. 628.

Volkmann remarks: "Die succedierenden Vorstellungen noch nicht die Vorstellung der Succession sind, weil das successive Vorstellen nicht das Vorstellen der Succession ist. Folgt der Vorstellung A die Vorstellung B, so vertauscht das Bewusstsein eben eine Bestimmtheit mit der anderen: dass B nach A komme, ist für unser Bewusstsein nirgends vorhanden, weil dieses Nach weder in der einen, noch in der andern, noch in einer dritten Vorstellung gegeben ist." (*Lehrbuch d. Psychologie* (Cornelius), II. p. 11.)

"Successive impressions can not of themselves account for the perception of succession." (*Philosophical Dictionary* (Baldwin), II. p. 702 a.)

edged to be a distinct problem of the first importance to understand how a successive series of ideas is known, or knows itself, as such. And it is a problem of equal difficulty whether the series be conceived either as an open or a close one; that is, either as a series of separately existing ideas like the mental series as thought of by Hume, or as a series of connected ideas as understood by the later psychologists who define the mind as a process or stream.

The great defect in a successive series, taken in itself or abstractly, especially a series considered as discrete, is that there is nothing in it to hold the successive terms together, to bind them in a unity of a succession known as a succession or as temporal. Another very important fact to be considered, and one true of both discontinuous and continuous successions, is, that the terms pass one after another and are gone, so that at each moment there is only one term, or only simultaneous terms, present. But a single term or simultaneous terms can not afford the thought of succession. The words of James Mill are pertinent: "One idea would follow another. But that would be all. Each of our successive states of consciousness, the moment it ceased, would be gone forever. Each of those momentary states

would be our whole being." * It seems quite evident, therefore, that to know a succession of ideas as a succession there must be more than the pure or abstract succession itself. The succession must be united with permanency; the successive ideas must be associated with a permanent element, or a permanent identical something, which runs along with them, which survives them as they pass and perish, and is capable of holding them in the unity of a known succession. †

What, then, is this permanent identical factor that continues through the succession of our ideas and makes possible knowledge of them as successive

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* *Analysis* (J. S. Mill's edition), I. p. 319.

† "There is a permanent in the perception of change, which goes right through the succession and holds it together." (Bradley, *Appearance and Reality,* p. 52.)

"Without an identity to which all its members are related, a series is not one, and therefore is not a series." (*Ib.,* p. 49.)

"If all things flowed the illusion of permanence would be impossible. There must be some permanent factor somewhere to make the notion possible. A flow can not exist for itself, but only for the abiding. The knowledge of change depends on some fixed factor which, by its permanence, reveals the change as change. * * * It is commonly overlooked by speculators that succession and change can exist, as such, only for the abiding." (Bowne, *Metaphysics,* Second ed., p. 60.)

or temporal? Various answers have been given to this question; some of which we shall attentively consider later on. The answer to be given here will, we are aware, find but little favor with many of our professional psychologists. This permanent something coexistent with the successive ideas, and continuing while they are transient, is the mental substance, which is the bearer, the subject, the producer, of all our successive thoughts or conscious modes. The thought of succession or time always occurs with our successive thoughts, not only because they are successive, but also because of their momentary but unbreakable relation to the temporal, permanent, identical mental reality. The unconscious mind indeed knows nothing. The mind knows only in its conscious modes; but because of its permanent identity it is capable of cognizing the time of its successive experiences or the stream of consciousness and its own time.

Mind embraces within itself both succession and permanency. This is nearly the same fact as that the mind embraces within itself both change and the unchanging. Change is indeed succession, but it may be something more; and the unchanging is not entirely the same as the permanently identical. A very important problem for the psychologist is

to divide, and define with reference to each other, the successive in mind and the permanent, change and the unchanging. We shall treat of this problem here only very briefly; a fuller discussion of it will more fitly find place in a chapter on the nature of the soul. Change in mind is the succession of our varied conscious modes. The unchanging in mind are the permanent possibilities of the conscious modes, or the permanent potentialities which are realized and revealed in the conscious modes. The permanent possibilities or potentialities are real; they are the elements or constituents of the unitary and indivisible substantial mind, and are always essentially the same with themselves. The unchanging nature of these permanent potentialities is made manifest in the identity of our conscious modes through life. Many sensations remain the same from childhood to age; the sky has the same blueness, and many other objects have the same color. Many pleasures and pains, passions and affections, continue the same. The feeling of duty is the same for many years. Volition is the same exertion of mind. Changes of conscious modes and the unchanging in mind, correspond to motions and identical substance in a material body. The mind has changes and permanent identity, just as

a material object may have successive and varying motions with permanence and identity. Change in mind is temporal. And so is the unchanging; it has duration.

The mind we say is cognizant of its past, or embraces its past and present experience in the unity of knowledge, on the primary condition of its own permanent identity; or, which is the same, because itself had a past and has endured in identity from the past to the present. There is no immediate knowledge of past experiences; for they have vanished. But the mind that had the experiences has not vanished, it has continued the same to the present; and because of its being in the past and in the present, it is competent to embrace the past and present in a unitary and indissoluble knowledge. It should yet be considered that while our knowledge of the past and present is a unitary knowledge, it still consists of two distinct modes of knowledge, namely, the direct knowledge of the present, and a sort of mediate knowledge of the past or a belief.

We have before recognized the important fact often emphasized that we have immediate knowledge of the present only, and the need of ascertaining what kind is our knowledge of the past.

Knowledge of the past has often been called mediate knowledge; but psychologists in many cases have failed to attempt a careful and thorough account of its character as mediate.* It seems clear that our knowledge of the past is not mediate in the sense of being inferential. For we are never conscious in this cognition of inferring, or of any process of ratiocination whatsoever. Our cognition is absolutely unreasoned, spontaneous, involuntary. It is most distinctly a conviction or belief which rises into consciousness without induction or deduction of any sort. We may call it mediate, on the ground of the conjecture that it comes through abiding modifications of the mind caused by the presentations remembered; yet how the mind produces the belief in the past from its own enduring modifications is to us an insoluble mystery. It is a present conviction of an experience which is gone; a knowledge of something which is no more. Memory or the thought of the past is a double mystery. It is a mystery in its rise, as is every mode of consciousness. Again, it is a mystery in being a cognition

* Sir W. Hamilton acutely remarks of memory: "In philosophical propriety it is not a knowledge of the past at all, but a knowledge of the present and a belief of the past." (*Metaphysics*, p. 153.)

of something not present, but absent. We can only conclude in general that present remembering thought does not produce the conviction of the past, but is itself in an undiscoverable manner the product and revelation of the past, or has as its necessary cause the actual endurance of the mind from the past to the present. We must suppose that permanent reality by some means causes thought, and not thought permanent reality or the false appearance of it.

Our knowledge, therefore, of the time of the mind, or the relation of its present to its past, is a union of immediate and a peculiar species of mediate knowledge,—immediate knowledge of present affection of mind and mediate knowledge of past affection. But though the knowledge consists of these two modes, it is a genuine unitary knowing. We know the past as such only with the immediate knowledge of the present. We know the present as such only with the mediate knowledge of the past. The cognition is of two kinds, but yet one and indivisible, as are in a manner the past and present themselves.

According to the above view, then, our thought does not produce duration, but real duration produces or is the necessary foundation of our thought.

We must conclude that if the mind did not continue in its identity from the past to the present, the thought of the past would not exist and would be impossible. The mind has, with its permanence and identity, the unique capability of knowing, reproducing, remembering, its past experience. If it vanished as its past experience has vanished, there would never be a thought of that experience. The possibility of it would be extinguished. An abstract succession of perishing ideas or conscious modes, whether continuous or discontinuous, could never give the knowledge of the past or of time.

But though the actual duration of the mind is the most apprehensible and satisfactory cause of the thought of its duration or the duration of experience, it does not afford a complete answer to questions regarding the rise of the thought of the mental past. The very profound and difficult question yet remains: Since, as is generally held, we have immediate knowledge only of present states of mind, how yet, even with the permanence and identity of the mind, with its real duration, do we possess with the knowledge of the present the thought also of the past? How can our present thought grasp the past? How comes the thought of the present to be indissolubly yoked in con-

sciousness with the thought of the past? It must be confessed that we have here an unanswerable question, and that so far the rise of the idea of the past is inexplicable. There is no adequate faculty of introspection. We conjecture that past experience, a past sensation or other presentation, produces a permanent change, modification, effect, in the mind, and that in this permanent effect or in immediate association with it there is the permanent possibility or capability of the reproduction of the past experience which produced it. None the less does it remain a mystery how the present reproduction or representation carries with it the conviction that it is an image of the past, that there was a past experience as really as there is the present representation. We have, therefore, at last only the general conclusion, that the actual duration or permanence of the mind, its real continuance in identity from the past to the present, is an indispensable condition of the thought of the past. But how even the permanent mind becomes aware of a successive series of feelings, or how in a present act it cognizes a past act, is incomprehensible. The best thing we seem able to do is to accept the inexplicable fact as ultimate.

We should yet remark, to meet a possible query, that, in affirming that the mind knows the past because it was in the past and survives, there is in no wise involved the conclusion that the mind then can know only its own past or the past where it itself was. The mind easily knows past time much longer than its own—time extending backward immeasurably farther than the beginning of its own existence. The only assumption we make is that the mind's knowledge of its own past is the indispensable ground for its knowledge of longer past time; that its knowledge and measurement of the longest times is the ideal repetition, multiplication and continuance of its own duration.

It has been accepted and employed above as a fundamental principle, that the mind knows the past because itself had a past; or that the knowledge of time has its necessary ground in the mind's real time, that the knowledge is but the self-revelation of the property. Many metaphysicians have stoutly contended for just the opposite principle, namely, that the mind knows time because it is itself not in time or is timeless; that if the mind or self were not timeless or were not capable of a timeless per-

ception of succession, the perception of succession would not be. They claim that the succession of experience, to be known as successive or temporal, must be represented simultaneously by the timeless mind or consciousness; that succession is not known in contrast with permanence, but in contrast with timelessness. We quote from statements of Professor Green: "The relation of events to each other as in time implies their equal presence to a subject which is not in time. There could be no such thing as time if there were not a self-consciousness which is not in time."* He says also: "Neither can any process of change yield a consciousness of itself, which, in order to be a consciousness of the change, must be equally present to all stages of the change; nor can any consciousness of change, since the whole of it must be present at once, be itself a process of change."† "A succession always implies something else than the terms of the succession, and that a 'something else' which can simultaneously present to itself objects as existing not simultaneously, but one after another."‡ "The eternal subject, which is the condition of their being a succession in time, can not itself exist as a succes-

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* *Prolegomena to Ethics*, p. 55. † *Ib.*, p. 22. ‡ *Ib.* p. 34.

sion. And its reproduction of itself in man carries with it the same characteristic." *

Our first resistance to the apparent teaching of these passages is against the assumption of a timeless mind or subject and timeless consciousness or thought. The truth appears to be that there is not a reality on earth known to be timeless or out of time. There is not apparent the least real evidence of a timeless subject or entity of any kind in the

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* *Prolegomena to Ethics,* p. 105.

"If there were nothing unchanging and timeless in the mind, the knowledge of succession could never arise. The mind must gather up its experiences in a single timeless act in order to become aware of succession. The conceptions which are arranged in a temporal order must coexist in the timeless act which grasps and arranges them. The conception of sequence not only does not involve a sequence of conceptions, but it would be impossible if it did. The perception of time, then, is as timeless as the perception of space is spaceless. The things which are perceived in time must yet coexist in timeless thought in order to be so perceived." (Bowne, *Metaphysics,* p. 174.)

"A continuous ideation, flowing from one point to another, would indeed *occupy* time, but not *represent* it, for it would exchange one element of succession for another instead of grasping the whole succession at once. Both points — the beginning and the end — are equally essential to the conception of time and must be present with equal clearness together." (Herbart, quoted by James, *Psychology,* I. p. 608.)

universe as far as it is known. Time is everywhere; it is upon everything. An unchanging reality is temporal; for it has duration. We have never cognized, we can not even imagine, a timeless thing. Of course, by composition of words, by the aid of prefixes and suffixes, we can easily speak of the non-temporal, the timeless, the out-of-time; but such is the forceful and perpetual dominion of time over our mind that we are unable to conceive or picture it. We can no more imagine things out of time than we can out of space. And even thought is not timeless, but temporal; the thought of time itself is temporal. Our first thought of time is as long as the time thought of; but on the basis of this primitive cognition we soon become capable of cognizing a much longer, at last an almost incalculably longer, time than our thought. This is the result of the synthetic function of the intellect operating with the primitive simple experiences.

Next, we can not yield to, but must resist, the unqualified capital predication, that the terms of a succession can at once be "equally present" to consciousness, or consciousness equally present to them. It seems to involve a grave misapprehension of the most significant facts in the cognition of time. For, in every ordinary successive series of mental

affections, only the last term of the series is present to consciousness; the antecedent terms are not equally present with the last term, indeed they are not present at all, they are only represented by reproductions of themselves or by memories. And, further, even the memories of the antecedent terms are not equally present; for they differ in vividness, the memories of the nearer terms being brighter than those of the remoter. In apparently ignoring the fact that the terms of a succession are, in the way just stated, *not* equally present to consciousness, Professor Green neglects the most important fact in the cognition of succession or time.

Undoubtedly, in the cognition of succession, as a succession coming down from the past to the present, a simultaneous series of phenomena must be present to consciousness. But this series is not a series of presentations, like the original terms of an ordinary successive series; it is composed of a presentation and memories,—of one (that is, the last) term present for itself, and the others present only by their representative images. It is because of this very inequality or unlikeness of the terms of the present simultaneous series—because the series is a union of presentation and representations—that the cognition of succession is possible. If the

terms were "equally present" to consciousness, as Professor Green seems obtusely to mean, not succession would be cognized, but only simultaneity or coexistence; and, with this fact, we are left to wonder how the thought of succession could ever come in. In the consciousness of the simultaneous series, composed of a presentation and memory-images, we are cognizant of succession only because the series represents an actual successive series that is past or in part past. It is useless to assert or suppose that the knowledge of succession does or ever can come out of pure simultaneity — simultaneity of undifferentiated units or undifferentiated presentation and representation.

But the question yet remains, how can a present thought have hold of, or be known as the image of, a past experience? how can a present simultaneous series of presentation and representations make us cognizant or convinced of a past successive series? This is the deep mystery of memory, which has been already dwelt upon; and we can only repeat our confession that it seems insoluble. We can go no farther towards a solution than the fact that the mind, on account of its own real endurance from the past, is able to cause in a present thought or memory-image the conviction of the past, or to

cause, in a cognition embracing simultaneous phenomena, the conviction of a succession. The mind was in the past and has endured, and for that reason it can think in the present of the past, or has the unique and inexplicable power of attaching or imparting to a present feeling the belief of the past.

This result is identical with the doctrine we were advocating above, that only a temporal mind can cognize time, or that the mind cognizes time because time is its property. The psychologists whom we have just quoted from teach that only a timeless subject can cognize succession or time, "that there could be no such thing as time if there were not a self-consciousness which is not in time," that a succession to be known as such must be a simultaneity to a non-temporal mind. Why should they assert and so resolutely contend for this view? Is it because they suppose the cognition of time requires the contrast between succession and timelessness? or that the thought of succession can only come out of the pure thought of simultaneity? Such suppositions are quite unjustifiable. Succession can not be known without comparison with permanence; it can be known only against permanence as a background, or it is held together in thought by the permanent that continues through

it; it is known in contrast of itself with permanence within the unity of the knowing subject; but there is no necessity for contrast with the timeless. As far as we know there is no timeless subject or reality of any kind in existence, not even an imaginable one, which would make such a contrast a genuine actuality.

The doctrine of the perception of time by the timeless seems to go on the main postulate, that the timeless subject creates time and the knowledge of it, or that it makes time in the knowing of it. But such a postulate is unreasonable. It is quite deficient in evidence. There is no proof that man's mind possesses such creative power respecting anything. It no more makes time in the knowing of it than it makes spatial extension in the knowing of it. Time precedes and is independent of our thought, like space; and both temporal and spatial series are of our original and simple experiences. A theory of the cognition of time, or of anything else, that demands for the mind such great power and liberty of creation should be allocated to the realm of myth rather than to the realm of genuine science. How can the timeless mind produce a reality or property that is directly opposed to its own nature? This

would be unnatural causation. A cause can produce something like itself, but not its contrary or opposite. Not a timeless mind creates time, but a temporal mind produces the thought of time.

We therefore earnestly reject the hypothesis of the perception and creation of time by the timeless, and accept as more reasonable and altogether superior the doctrine, that the mind perceives time because it is itself temporal, that the mind because of its own real duration is capable of the knowledge of duration, that the knowledge is the expression and revelation of the mind's real quality. We must contend that the conception of revelation is superior to the conception of creation; that causation of the like is more reasonable than causation of the contrary; that the production by the mind of a thought corresponding to itself is more reasonable than the production of a thought opposite to itself, or the production of the thought of time by a temporal cause more reasonable than by a timeless one; and, conversely, that it is more reasonable that a thought should be of a character corresponding to its producer, than of the opposite character. But we shall save words here. It is not our purpose to attempt an exhaustive statement of a theory, and to meet,

so far as possible, all actual and supposable objections. We only aim and hope to present capital points in a clearly intelligible form.

A large number of psychologists explain the cognition of time on the presupposition, which is fundamental with them, that there is no permanent and identical mental subject, and that the only mind, and all of mind, is the abstract succession of thoughts or stream of consciousness. The only certain permanent and identical reality they acknowledge in psychology is, not the mind, but the neural organism, especially the brain, which is conceived to be the subject, support, if not generator, of the successive mental phenomena. Among the most distinguished representatives of this school of psychologists is Professor W. James; and we design to give here some special consideration to his discussion of time-cognition. The rich and brilliant, though somewhat irregular and imperfectly articulated, chapter in his *Psychology* on the perception of time is well and widely known, and therefore any references to it will be easily and immediately understood.

The essence of Professor James' theory of the cognition of time seems to be contained in the

following propositions: "The brain-processes of various events must be active simultaneously, and in varying strength, for a time-perception to be possible." * *"There is at every moment a cumulation of brain-processes overlapping each other, of which the fainter ones are the dying phases of processes which but shortly previous were active in a maximal degree. The* AMOUNT OF THE OVERLAPPING *determines the feeling of the* DURATION OCCUPIED." † "The feeling of a time-duration is the immediate effect of such overlapping of brain-processes of different phase." ‡

The primary question with our author is, To what cerebral process or particular element "is the sense of time due"? This question is indeed primary because of the great importance assigned by him in general to the brain in the production of the mental experiences, and of the importance imputed in particular to the brain as the organ of the mnemonic functions of retention and reproduction. He thus answers this cardinal question of the relation of brain-processes to the sense of time: "It can not, as we have seen, be due to the mere duration itself of the process; it must be due to an element

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* *Psychology*, I. p. 632. † *Ib.*, p. 635. ‡ *Ib.*, p. 637.

present at every moment."* He remarks again: "The *cause* of the intuition [of time—especially the "specious present"] which we really have can not be the *duration* of our brain-processes or our mental changes. That duration is rather the *object* of the intuition which, being realized at every moment of such duration, must be due to a permanently present cause. This cause—probably the simultaneous presence of brain-processes of different phase—fluctuates."† This permanent cause or element is the supreme factor in Professor James' theory of time-perception, and therefore requires special notice.

The first thing to be ascertained is the nature of the permanent element, or the particular character of its permanency. This permanency is the overlapping or partial simultaneity of waning and waxing brain-processes, and its peculiar character is to be noted. It is obviously only the permanency of a floating simultaneity; and is therefore of very different nature from what is commonly meant by permanency. What we commonly mean by a permanent element or thing is something that remains identical through changes or succession, that does

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* *Psychology,* I. p. 632. † *Ib.,* p. 642.

not pass with the succession, but abides after the succession has ceased. For instance, we would say that a rolling stone has permanence, because it continues the same through the revolutions, and abides when the revolutions have ceased. But Professor James' permanence of simultaneity has not that character. In the simultaneity of brain-processes everything is on the go. The simultaneity moves on with the processes. It does not continue the same; but is constantly changing in character with the special character of the processes it at each moment embraces. It does not remain after the processes have passed and ended; but ends with them. Therefore it is evident that the permanence of the simultaneity of successions is quite different from the permanence of an identical thing and from genuine permanence.

Here we seem to discover a fatal defect in Professor James' theory of time-perception. It appears certain that, as already maintained, a process or succession can be known as such, not taken by itself, but only in comparison with a permanent element, which runs along with or through the succession, and renders awareness of it, or the holding of it in a unitary thought, possible. This is admitted by many psychologists. Our author himself

expressly says: The sense of time is not due to the mere duration itself of the brain-process, but to an "element present at every moment," or to a "permanently present cause." He remarks also, as we have noted, of mental succession: "A succession of feelings is not in and of itself a feeling of succession." The permanently present element or cause he appears to mean is the simultaneity of brain-processes varying in strength. But, as just observed, this is no real permanent cause, it has little of what is usually called permanency; for it does not preserve identity, and remain after the processes which it includes have ceased; it moves, changes, and perishes, with the processes. There is here only a succession or peculiar mode of duration, but no genuine permanency. The like must be said of the simultaneity of the mental processes which are supposed to be caused by, and which immediately accompany, the brain-processes, and whose succession or time is alone directly known. It constitutes no true permanent element. It is not the element demanded in order that a succession of feelings may be aware of itself as a succession. Professor James seems to be deceived in supposing such a permanence is sufficient for the perception of time,

or is the sort of permanence which the perception requires. The simultaneity is really but a succession and passes with the successions it unites. It can contribute nothing to the cognition of succession. From such a simultaneity no thought of succession can ever spring.

But Professor James believes in and makes conspicuous use of a true permanent reality, which, very strangely, he leaves, as regards its permanence, without distinct recognition in his discussion of time-cognition. In many sections of his *Psychology* he clearly and freely treats the brain as a persistent entity, a permanent subject of successive and simultaneous motions or processes,—which precedes processes, endures in its identity with them, and remains when they have passed. He also speaks of, and deems very important, permanent brain-paths, or established lines of motion in the brain, each of which may be at one time "active" and at another time "slumbering."* Here is a genuine permanent cause; not a mere simultaneity of processes or motions; but a permanent and identical reality which, coexistent with the motions, also possesses them and abides when they have ended. This cause possesses

* *Psychology*, I. p. 655.

the sort of permanency which is demanded and is indispensable in time-perception.

It is quite obvious, therefore, that, in his theory of the cognition of time, Professor James does not, for some reason, distinguish and "work" the permanent brain, which he so freely and fully acknowledges and employs elsewhere, for all it should be worth. It ought to have, in his cerebral theory of time-perception, a like place and significance to that which the permanent and identical soul has in the spiritualistic theory. If the brain by its permanent "organized paths" retains and reproduces thought, it ought mainly by the same means to produce the sense of time. If the paths are the "permanent ground"* of retention and recall, why should they not be distinctly owned as the permanent ground of time-perception? The persistent brain is a good deal more than the transient processes of its activity, for it continues when they have ceased; why, then, is the persistence not of as much importance in time-cognition as the processes? But he leaves the permanent brain without particular recognition; treating the brain-processes, with their succession and overlapping or simultaneity, as

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* *Psychology,* I. pp. 654-5.

if they were abstracted from, or had no important or necessary relation to, the permanent brain in the perception of time. This course as to the brain is just like the course of those who take the process of our thoughts or the stream of consciousness as if entirely abstracted from the permanent soul, or as if it were itself the complete and only soul. But in these conceptions of cerebral process and mental process there is no recognition of a real permanent element — of a real permanent brain or a real permanent soul; and there is, therefore, left unnoticed and unappreciated a primary condition of the feeling of duration, of the knowledge of a succession as a succession, of the representation of a succession simultaneously or at one moment, or the present feeling of a past time. A real permanent entity seems to be indispensable for the sense of time even within the short and bright tract of the so-called "specious present."

There are two principal conditions of the feeling of time-duration, or of the cognition of a succession as a succession, namely, a succession, and a permanent and identical element in or with the succession. There must be a succession, a real succession, to be known. But since a succession in and of itself is not a known succession, there must be a reality

of permanent identity as the necessary condition of the succession being aware of itself as a succession, or of past segments of the succession being known at the present moment. There must be an entity which, because of its permanence, was present with every part of the succession, and for that reason can at a moment represent simultaneously the succession,—which, because it was present to all parts, and remains in its identity after the antecedent parts have perished, can make a unitary representation at one moment of the past parts, or cause the feeling of past time to exist in a present feeling. Such a permanent entity is indispensable to the cognition of time. It must be contended, then, that the cognition of time could never occur with the pure thought-succession or stream of consciousness which many assert to be the whole of mind, denying the existence and necessity of a permanent mind or soul. No matter how perfectly continuous the succession may be by close connection and overlapping, yet there is altogether wanting a permanent element of that character which is absolutely necessary to the feeling of time; certainly, if the permanent brain be not owned, and if it be not the adequate permanent and sole cause of the mental stream, or be not

itself the real mind. The stream could never be aware of itself as a stream. The claim of self-knowledge for the stream involves an unconscious surreption. In truth, the whole of the stream at any moment is the passing thought; and this sole living thought can not of itself know anything of the past. It has no permanence at all; it was never in the past; it has no real hold on the past as past; and the feeling of the past is impossible to it. The present momentary thought is not less completely separated from its antecedents than if it were separated by a void space or impassable gulf; since its antecedents have perished. The primitive perception of time depends upon the continuous motions of the brain that arouse continuous mental experiences, with which the feeling of time is directly given because of the permanent identity of the mental substance to which they belong,—which substance has a permanence corresponding to the permanence cerebralists impute to the brain.

In his hypothesis of time-perception, Professor James reckons very great importance to the so-called "specious present," which has a duration of several seconds only. He says of it: "The original paragon and prototype of all conceived times is

the specious present, the short duration of which we are immediately and incessantly sensible."* He remarks also: "A creature might be entirely devoid of *reproductive* memory, and yet have the time-sense; but the latter would be limited, in his case, to the few seconds immediately passing by."† With respect to these statements we observe first, that they seem to contain the implication of an immediate or direct intuition of duration, without memory. But such intuition is quite disputable. Memory is as really concerned in the perception of time within the charmed space of the specious present, as of any time extending beyond it. Whenever there is the sense of time or succession with simultaneous affections of consciousness, however brief the succession and the simultaneity, memory seems certainly to be involved. The shortest succession known is known by comparison and union with real permanence which has retention and reminiscence; a conclusion that seems not in discord with the full use Professor James makes, in his chapter on Memory, of the permanent "nerve-substance" or permanent "cerebral substratum."‡ The consciousness of a musical melody or rhythm within the specious pres-

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* *Psychology*, I. p. 631. † *Ib.*, p. 630. ‡ *Ib.*, p. 657.

ent is possible, not solely or primarily because of the overlapping of cerebral processes and of mental processes, but because the mind, owing to its permanent identity, simultaneously represents successive tones. Professor Royce speaks of sequence as being grasped at once, and as thus grasped "not through mere memory, but by virtue of actual experience."* It is very doubtful whether a sequence is ever grasped and felt as such, or actually experienced, without memory. If there were not actual permanence, which is much more than simultaneity of processes or successions, and memory, the shortest time, any time at all, would be incognizable. The "specious present," as treated by various writers, has a likeness, in its vagueness, to the "extensity" which is advocated by some psychologists; and is liable to the same danger, namely, the danger of being used as a means by surreption.

It is a fact of the first importance pertaining to the specious present, that within it the cognition of time is as long as the time cognized. Every cognition of time is, not timeless, but temporal; but all cognitions of time are not as long as the times cognized; many known times are vastly longer than

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* *The World and the Individual*, I. p. 142.

the times of knowing them, as the times of history and some of the sciences; but within the few seconds of the specious present the time of knowing is as long as the time known. This knowing that is as long as the time known is the foundation fact in our total cognition of time. It is the necessary basis of all knowledge of times longer than the process of knowledge. Starting with this primitive perception, we advance by the synthesizing intellect to the knowledge of the time of our life or total personal experience; and by the time of our personal experience we are made able to represent and measure prodigious time beyond it.

Hitherto we have followed the proposition made at the outset to treat first chiefly of our cognition of past time, or of the relation of the present to the past, particularly of the relation of the mind's present to its past, and to omit for the most part the consideration of the future. This course is justifiable under the assumption that the knowledge of the past is the more certain and the necessary preliminary to the knowledge of the future. But the course is opposed to the contention of some psychologists. For example, it has been said: "On the whole, anticipation of the future must be regarded

as prior in the order of development to reminiscence of the past. For the primary stimulus to ideational activity comes from practical needs; and these are in the first instance concerned with the future."* We can not, however, but think that the writer here reverses the true order of occurrence. Rather, we come to expect the future because of the previous involuntary and necessitated experience of the relation of the past to the present. We come to know the present as having been future to the past; and by this experience, as the primary condition, we are led to expect a future to our present. We thus anticipate a future becuase we know a future has been. Without knowledge of a past future, so to speak, there would be no thought of a future to come. Thought does not, under the stimulus of emotion, create the future, but only forecasts what has been. In fine, familiarity with the relation of the present to the past and of the past to the present is the ruling primitive prompting or condition to the anticipation of the future. Memory precedes expectation.

It is important in considering the knowledge of the future, as in considering the knowledge of the

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* Stout, *Manual of Psychology*, p. 497.

past, to remember that we have immediate knowledge only of the present. As we have no immediate knowledge of the past because it is gone, so we have no immediate knowledge of the future because it is not yet. Our knowledge of the future may be classified as mediate knowledge; but it is of a very peculiar character. We generally call it expectation; but it often involves great assurance. The knowledge of the future is the result of the necessary union of immediate and mediate knowledge. We know it only in connection with the immediate knowledge of the present. The future is never separated from the present by actual partition, and expectation of it never exists apart from the immediate knowledge of the present. In this instance, the two modes of knowledge constitute an indivisible unit.

H 149 82

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